

REQUEST FOR QUALIFICATIONS

FOR THE

**Nonresidential Building Energy Efficiency
Standards for 2011**



RFQ #400-08-404

www.energy.ca.gov/contracts

**State of California
California Energy Commission**

February 2009

Table of Contents

I. INTRODUCTION.....	1
BACKGROUND SUMMARY	1
PURPOSE OF THIS RFQ	1
RFQ ORGANIZATION.....	1
AVAILABLE FUNDING.....	2
RETAINER CONTRACT	2
KEY ACTIVITIES AND DATES.....	3
HOW TO RESPOND TO THIS RFQ	3
HOW TO OBTAIN FURTHER INFORMATION	3
PARTICIPATION THROUGH AUDIO ONLY	4
VERBAL COMMUNICATION.....	4
WHOM TO CONTACT	4
REFERENCE DOCUMENTS	5
BIDDER’S RESPONSIBILITIES FOR SUBMITTING A STATEMENT OF QUALIFICATIONS.....	7
II. SCOPE OF WORK.....	8
ABOUT THIS SECTION	8
BACKGROUND	8
PRIMARY TASKS.....	10
TASK 1 - EVALUATION OF THE COST EFFECTIVENESS OF SOLAR ELECTRIC SYSTEMS IN NONRESIDENTIAL BUILDING STANDARDS	11
TASK 2 - LIFE CYCLE COST METHODOLOGY FOR THE 2011 STANDARDS	12
TASK 3 – 2011 STANDARDS NONRESIDENTIAL MEASURE IDENTIFICATION AND ANALYSIS PLAN	13
TASK 4 – NONRESIDENTIAL ALTERNATIVE CALCULATION METHOD (ACM).....	15
TASK 5 - LIFE CYCLE COSTS AND ENERGY ANALYSIS REPORT FOR MANDATORY NONRESIDENTIAL STANDARDS.....	16
TASK 6 - LIFE CYCLE COSTS AND ENERGY ANALYSIS REPORT FOR REACH NONRESIDENTIAL STANDARDS	17
TASK 7 - STANDARDS, REFERENCE APPENDICES, AND NONRESIDENTIAL ACM MANUAL	17
TASK 8 - IMPACT ANALYSIS REPORT FOR MANDATORY NONRESIDENTIAL STANDARDS	18
TASK 9 - IMPACT ANALYSIS REPORT FOR REACH NONRESIDENTIAL STANDARDS	18
TASK 10 - PARTICIPATE IN RULEMAKING PROCEEDING.....	19
TASK 11 - NONRESIDENTIAL COMPLIANCE MANUAL	19
TASK 12 - CONTINGENCIES AND ADDITIONAL TOPIC AREAS.....	20
TASK 13 – CONTRACT MANAGEMENT	20
III. KEY TOPIC AREAS FOR THE 2011 STANDARDS.....	24
IV. SOQ FORMAT AND REQUIRED DOCUMENTS.....	48
ABOUT THIS SECTION	48
PRICING/RATES INFORMATION	48
REQUIRED FORMAT	48
VOLUME 1, ADMINISTRATIVE RESPONSE FORMAT	49
COVER LETTER.....	49
TABLE OF CONTENTS	49
REQUIRED DOCUMENTS AND STATEMENTS.....	49
VOLUME 2, TECHNICAL RESPONSE FORMAT	49
APPROACH TO TASKS IN SCOPE OF WORK.....	49
CONTRACTOR’S QUALIFICATIONS	49
COST MINIMIZATION	50
PROJECT TEAM ORGANIZATION STRUCTURE.....	50
PROJECT TEAM RELEVANT EXPERIENCE AND QUALIFICATIONS.....	51
CUSTOMER REFERENCES	51
V. RFQ ADMINISTRATIVE REQUIREMENTS.....	52
ABOUT THIS SECTION	52
RFQ DEFINED	52

WHERE AND HOW TO DELIVER THE SOQ.....	52
IMPORTANT ADMINISTRATIVE DETAILS	52
“COMMERCIALLY USEFUL FUNCTION” REQUIREMENTS FOR DVBE.....	53
NOTICE OF SELECTION	54
NEGOTIATIONS	54
RFQ CANCELLATION	55
RFQ AMENDMENTS	55
MODIFYING OR WITHDRAWING AN SOQ.....	55
DISPOSITION OF BIDDER’S DOCUMENTS.....	55
CONTRACT REQUIREMENTS	55
CONFLICT OF INTEREST	56
BIDDERS’ ADMONISHMENT	56
GROUND TO REJECT AN SOQ	56
VI. QUALIFICATIONS EVALUATION	57
SELECTION PROCESS STEPS	57
FULFILLMENT OF RFQ MANDATORY FORMAT	57
EVALUATION OF QUALIFICATIONS	57
DISCUSSIONS	57
HOW THE SOQ WILL BE SCORED	58
POINT SCALE.....	58
RANKING AN SOQ.....	58
CRITERIA FOR EVALUATION.....	59

Exhibit

A	Evaluation Criteria
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Attachments

- | | |
|-----|---|
| 1 | Contractor Status Form |
| 2 | Darfur Contracting Act Form |
| 3.1 | Disabled Veteran Business Enterprise Certification Application Instructions |
| 3.2 | Disabled Veteran Business Enterprise Program Requirements |
| 4 | Contractor Certification Clauses |
| 5 | Customer References |
| 6 | Standard Agreement Example |
| 7 | Target Area Contract Preference Act (TACPA) Request |
| 8 | Enterprise Zone Act (EZA) Preference Request |
| 9 | Local Agency Military Base Recovery Area (LAMBRA) Act Preference Request |

I. INTRODUCTION

Background Summary

This Request for Qualification (RFQ) seeks technical support services to the California Energy Commission (Energy Commission) to develop the 2011 Building Energy Efficiency Standards (Standards) update. The Warren-Alquist Act of 1976 mandated that the Energy Commission create and periodically update building energy efficiency standards in the state of California. These standards address newly constructed and additions and alterations to existing residential and nonresidential buildings. First adopted in 1977, the Standards have been periodically updated approximately on a three year cycle. The most recent update, the 2008 Building Energy Efficiency Standards, will become effective August 1, 2009.

Purpose of this RFQ

The purpose of this RFQ is to solicit for and contract with a consultant with a team of qualified staff and subcontractors to provide architectural and engineering technical support to the Energy Commission in evaluating the cost-effectiveness of solar electric systems, and for the development of the 2011 updates to the Nonresidential Building Energy Efficiency Standards, including reach standards.

The Energy Commission is seeking a consultant or team of consultants with knowledge and experience concerning:

- Professional engineering and architectural design and construction of commercial (nonresidential) buildings;
- Development of building energy efficiency standards that govern the professional design and construction of nonresidential buildings;
- Each Scope of Work task, each Key Topic Area, and the development and implementation of the California Nonresidential Building Energy Efficiency Standards;
- The effectiveness and efficiency of proposed approaches to address each Key Topic Area and Scope of Work tasks;
- The ability to organize and manage a team of technical experts to effectively complete Scope of Work tasks and deliverables in a timely manner;
- The ability to effectively recruit and manage specific subcontractors with expertise in nonresidential building science, technology specialties, or construction practices in addition to the original list of subcontractors included in the proposal; and
- The effectiveness and efficiency of proposed approaches to address topic areas not anticipated by this RFQ.

RFQ Organization

This Request for Qualifications (RFQ) is organized into the following sections:

Section 1 – Provides a summary and administrative overview.

I. Introduction, continued

- Section 2 – Provides an explanation of the work to be performed.
- Section 3 – Provides an explanation of the format, documents, and technical expertise to submit a successful Statement of Qualifications.
- Section 4 – Provides administrative detail, including legal requirements of the RFQ.
- Section 5 – Provides an explanation of the evaluation process

Available Funding

There is a maximum of up to \$1,104,000 available for the contract resulting from this RFQ. This is an hourly rate plus cost reimbursement contract with a ceiling on the total contract amount.

Of this amount, \$468,000 is immediately available, and the remaining balance, \$636,000, may be available from Fiscal Years (FY) 2009/10 and 2010/11, subject to appropriations from the 2009-10 and 2010/11 Governor's Budgets. Fiscal year 2008/2009 is funded at \$468,000. Fiscal years 2009/2010 and 2010/2011 is funded at \$636,000.

The Energy Commission reserves the right to reduce the amount of the FY 08/09 funding to an amount deemed appropriate in the event the budgeted funds do not provide full funding of Energy Commission contracts. In this event, the Contractor and the Energy Commission Contract Manager shall meet and reach agreement on a reduced scope of work commensurate with the level of available funding. If funding for any fiscal year is reduced or deleted by the Budget Act for purposes of this program, the State shall have the option to either: cancel this Agreement with no liability occurring to the State, or offer an Agreement amendment to Contractor to reflect the reduced amount.

The Energy Commission is releasing two RFQ's for technical support on the 2011 Standards update. One RFQ is for the development of the Residential Standards and the other RFQ is for the development of Nonresidential Standards. The FY 2009-2010 funding and the FY 2010-2011 funding listed in each RFQ may be reallocated according to the needs of the Energy Commission. The Energy Commission may reallocate funds from one contract to the other in 2010 or 2011, as needed, to complete the required work on the 2011 Building Energy Efficiency Standards.

Retainer Contract

Any contract awarded as a result of this solicitation will be a no-fee "retainer" contract. The selected consultant will be held on retainer and will be assigned work via work authorizations. Work authorizations will be assigned by expertise, or project workload. The Energy Commission makes no guarantee that any or all of the funds will be assigned in any given year.

I. Introduction, continued

Key Activities and Dates

Key activities and tentative dates for this RFQ are presented below:

<u>Activities</u>	<u>Tentative Dates</u>
RFQ release	February 25, 2009
Pre-Bid Conference	March 11, 2009
Written Question Submittal Deadline	March 11, 2009
Distribute Questions / Answers and Addenda (if any)	March 18, 2009
DVBE Advertising Deadline	March 25, 2009
Deadline to submit SOQ	April 8, 2009 by 3:00 p.m.
SOQ Discussions with Bidders	April 21, 2009
Notice of Selection	April 22, 2009
Cost Negotiations	April 23, 2009
Notice of Proposed Award	May 5, 2009
Energy Commission Business Meeting	June 17, 2009
Contract Start Date	June 30, 2009
Contract End Date	March 31, 2012

How to Respond to This RFQ

Responses to this solicitation will be in the form of a Statement of Qualifications (SOQ) according to the format described in this RFQ. The SOQ shall document the Bidder's qualifications to perform the tasks described in the Scope of Work found in this RFQ.

How to Obtain Further Information

A Pre-Bid Conference will be held to answer questions. Please call (916) 654-4392 to confirm date, time, and location, or refer to the Energy Commission's Web Site at www.energy.ca.gov/contracts. Prospective Bidders are encouraged to attend the meeting to be held on:

March 11, 2009 at 10:00 A.M.
Hearing Room B
California Energy Commission
1516 Ninth Street, Sacramento, CA 95814

At the option of the Energy Commission, questions posed during the Pre-Bid Conference may be answered either orally or in writing.

Participation through WebEx, the Energy Commission's on-line meeting service.

To participate in the meeting using the WebEx onscreen and audio functions, please go to the following URL in your web browser on the date and time of the meeting:

I. Introduction, continued

<https://energy.webex.com/energy/j.php?ED=114029377&UID=1093371957&PW=fb0be1530d0e1d0d23470e5d57>

If the link above does not work, go to: <https://energy.webex.com/> and enter the meeting number: 929-613-635.

When prompted, enter your information and the following meeting password: cec@1516.

Provide your phone number, when prompted, to receive a call back on your phone for the audio of the workshop. Alternatively, you can call 1-866-469-3239 (toll free in the U.S. and Canada).

If you have difficulty joining the meeting, please call the WebEx Technical Support number at 1-866-229-3239.

Participation through audio only

If you do not have computer access and wish to participate in the meeting by phone, you can call 1-866-469-3239 (toll free in the U.S. and Canada).

Please be aware that the workshop's WebEx audio and onscreen activity will be recorded.

Verbal Communication

Any verbal communication with an Energy Commission employee concerning this RFQ is not binding on the State and shall in no way alter a specification, term, or condition of the RFQ. Therefore, all communication should be directed to the Energy Commission's Contract Officer assigned to the RFQ.

Whom to Contact

This RFQ is available through the Energy Commission's Web Site at www.energy.ca.gov/contracts. Questions or clarifications about this RFQ should be directed to:

Lori Tomita, Contract Officer
California Energy Commission
1516 Ninth Street, MS-18
Sacramento, CA 95814
Telephone: (916) 654-5833
FAX:(916) 654-4423

I. Introduction, continued

Reference Documents

Bidders responding to this RFQ may want to familiarize themselves with the following documents:

California Policy Documents

Water- Energy Relationship, In Support of the 2005 Integrated Energy Policy Report, California Energy Commission Staff Report, Publication No. CEC-700-2005-011, June 2005 (http://www.fypower.org/pdf/CEC_water-energy.pdf)

2007 Integrated Energy Policy Report, California Energy Commission, Publication No. CEC-100-2007-008-CMF, December 5, 2007
(<http://www.energy.ca.gov/2007publications/CEC-100-2007-008/CEC-100-2007-008-CMF.PDF>).

Integrated Energy Policy Report - 2008 Update, California Energy Commission, Adopted November 20, 2008, Publication No. CEC-100-2008-008-CMF,
(<http://www.energy.ca.gov/2008publications/CEC-100-2008-008/CEC-100-2008-008-CMF.PDF>)

California Long Term Energy Efficiency Strategic Plan, September 2008, California Public Utilities Commission
(<http://www.californiaenergyefficiency.com/docs/EEStrategicPlan.pdf>)

Climate Change Proposed Scoping Plan, a Framework for Change, Pursuant to AB32, The California Global Warming Solutions Act of 2006, October 2008, California Air Resources Board (<http://www.energy.ca.gov/2008publications/ARB-1000-2008-029/ARB-1000-2008-029-D.PDF>)

2007 California Green Building Standards Code, July 2008, California Building Standards Commission
(http://www.documents.dgs.ca.gov/bsc/prpsd_stds/2007/2007_cgbsc_9-23-08.pdf)

2008 Standards Documents

Life Cycle Cost Methodology, October 21, 2005
(http://www.energy.ca.gov/title24/2008standards/prerulemaking/documents/2005-10-24+25_workshop/2005-10-21_LCC_METHODODOLOGY_2008_STANDARDS.PDF)

Time Dependent Valuation of Energy for Developing Building Efficiency Standards 2008 Time Dependent Valuation (TDV)" - Methodology Report April 18, 2006
(<http://www.energy.ca.gov/title24/2008standards/prerulemaking/documents/E3/draft-reports/TDVmethodology2008.doc>)

Impact Analysis, Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings, California Energy Commission
(http://www.energy.ca.gov/title24/2008standards/rulemaking/documents/2007-11-07_IMPACT_ANALYSIS.PDF)

I. Introduction, continued

2008 Building Energy Efficiency Standards, California Energy Commission, Publication No. CEC-400-2008-001 (<http://www.energy.ca.gov/2008publications/CEC-400-2008-001.pdf>)

2008 Reference Appendices for Residential and Nonresidential Buildings, California Energy Commission, Publication No. CEC-400-2008-04
(<http://www.energy.ca.gov/2008publications/CEC-400-2008-001.pdf>)

2008 Nonresidential Alternative Calculation Method Approval Manual, California Energy Commission, Publication No. CEC-400-2008-003-15DAY
(http://www.energy.ca.gov/title24/2008standards/rulemaking/documents/nonresidential_manual.html)

2008 Nonresidential Compliance Manual, California Energy Commission, Publication No. CEC-400-2008-017-D2 (<http://www.energy.ca.gov/2008publications/CEC-400-2008-017/CEC-400-2008-017-D2.PDF>)

Cost-effectiveness of Solar Electric Systems for Building Standards

Moving Towards a More Comprehensive Framework to Evaluate Distributed Photovoltaics, Thomas E. Hoff and Robert M. Margolis, Prepared Under NREL Contract AAD-2-31904-03, June 6, 2005
(<http://www.cleanpower.com/research/customerPV/EvaluationFramework.pdf>)

Photovoltaics Value Analysis, February 2008, J.L. Contreras, L. Frantzis, S. Blazewicz, D. Pinault, and H. Sawyer - Navigant Consulting Inc., Subcontract Report NREL/SR-581-42303 (http://www1.eere.energy.gov/solar/solar_america/pdfs/42303.pdf)

Build-Up of PV Value in California – Methodology, April 13, 2005, Americans for Solar Power (<http://www.suncentricinc.com/downloads/aspv2005.pdf>)

2011 Standards Key Topic Areas

Climate Change, Extreme Heat, and Electricity Demand in California, a PIER Project Report prepared by Lawrence Berkeley National Laboratory, August 2007, Publication No. CEC-500-2007-023 (http://www.fypower.org/pdf/CEC_CC-ElectricityDemand.PDF)

The Cost of Climate Change: What We'll Pay if Global Warming Continues Unchecked, May 2008, National Resource Defense Council
(<http://www.nrdc.org/globalwarming/cost/cost.pdf>)

California Climate Risk and Response, November, 2008, Department of Agricultural and Resource Economics, University of California
(http://are.berkeley.edu/~dwrh/CERES_Web/index.html)

Energy Demands on Water Resources, Report to Congress on the Interdependency of Energy and Water. December, 2006, U.S. Department of Energy
(<http://www.sandia.gov/energy-water/docs/121-RptToCongress-EWwEIAcomments-FINAL.pdf>)

I. Introduction, continued

Water-Supply- Related Electricity Demand in California, a PIER Project Report prepared by Water and Energy Consulting and the Demand Respond Research Center, November 2007, Publication No. CEC-500-2007-114 (<http://drrc.lbl.gov/pubs/62041.pdf>)

California Economic Policy, Lawns and Water Demand in California, Public Policy Institute of California, July 2006 (http://www.ppic.org/content/pubs/cep/EP_706EHEP.pdf)

National Water Program Strategy: Response to Climate Change, September 2008, Office of Water, U.S. Environmental Protection Agency (http://www.epa.gov/water/climatechange/docs/TO5_DRAFT_CCR_Revised_10-16.pdf)

All the above list of references can be located at the website specified.

Bidder's Responsibilities For Submitting A Statement of Qualifications

Bidders must take the responsibility to:

- Carefully read this entire RFQ.
- Ask the appropriate questions in a timely manner.
- Submit all required responses in a complete manner by the required date and time.
- Make sure that all procedures and requirements of the RFQ are followed and appropriately addressed.
- Carefully reread the entire RFQ before submitting an SOQ.

II. SCOPE OF WORK

About This Section

In this section, the California Energy Commission (Energy Commission) describes the tasks the Bidder (referred to as “Contractor” in the Scope of Work) will be asked to perform under the direction of the Energy Commission Contract Manager (Commission Contract Manager). This section also describes the work assignment process, deliverables, and due dates.

Background

The Warren-Alquist Act of 1976 mandated that the Energy Commission create and periodically update building energy efficiency standards in the state of California. These standards address newly constructed and additions and alterations to existing residential and nonresidential buildings. The Building Energy Efficiency Standards (Standards) have, in combination with appliance efficiency standards and utility-sponsored incentive programs, strongly contributed to California’s per capita electricity consumption levels remaining relatively flat since the mid-1970s. First adopted in 1977, the Standards have been periodically updated approximately on a three year cycle. The most recent update, the 2008 Building Energy Efficiency Standards, will become effective August 1, 2009.

The proposed 2011 Standards will continue to improve upon the 2008 Standards in newly constructed residential and nonresidential buildings, and will continue to address policy directives that influenced the 2008 Standards update. These policy directives include the 2003 Energy Action Plan (EAP) which established a “loading order” of energy resources and strategies to address the State’s growing energy demands (through conservation and energy efficiency to minimize energy demand first, followed by electricity generation from renewable energy resources and distributed generation); and the 2004 Green Building Initiative (Executive order S-20-04), which directs the Energy Commission to undertake all actions within its authority to increase by 20% the efficiency requirements in the Building Energy Efficiency Standards for nonresidential buildings by 2015.

More recent policy directives that will impact the 2011 update to the Standards include the following:

The Climate Action Initiative (Executive Order S-3-05, June 2005) sets greenhouse gas (GHG) emission reduction targets for California, as follows: by 2020, reduce GHG emissions to 1990 levels, and by 2050, reduce GHG emissions to 80 percent below 1990 levels. Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006 (Núñez, 2006) codified the 2020 GHG emission reduction target into law. AB32 requires the Air Resources Board (ARB) to report and verify statewide greenhouse gas emissions. The Act further requires that the ARB, in coordination with other State agencies, achieve the maximum technologically feasible and cost-effective GHG emission reductions, setting the stage for the State’s transition to a sustainable, clean energy future.

II. SCOPE OF WORK, continued

The California Energy Commission's 2007 Integrated Energy Policy Report (IEPR) includes many greenhouse gas emission reduction and energy efficiency strategy recommendations. Energy efficiency is identified as the first strategy for accomplishing significant greenhouse gas reduction targets because it is a fast and inexpensive solution. The IEPR recommends that a statewide efficiency target be set at 100 percent of economic potential. The report concludes that for the building standards to reach the aggressive goals described in the various policy reports, initiatives, and legislation, vigorous energy efficiency coupled with technologies like solar photovoltaic systems will have to be accomplished. The 2007 IEPR established the goal that new building standards achieve "net zero energy" levels by 2020 for residences and by 2030 for commercial buildings. A net zero energy building consumes only as much energy on an annual basis as can be generated with an on-site renewable energy system.

The Green Building Standards (GBS) Code, adopted by the California Building Standards Commission in July 2008, sets voluntary stretch goals, as compared with the mandatory Standards, for newly constructed residential and nonresidential buildings. The Code creates tiered energy performance options of 15 percent and 30 percent more stringent than the mandatory 2008 Standards. Local jurisdictions may adopt the GBS Code as mandatory at the local level.

The California Public Utility Commission's (CPUC) California Long Term Energy Efficiency Strategic Plan (July 2008), endorses the Energy Commission's zero net energy goals for all newly constructed homes by 2020, and 2030 for all newly constructed commercial buildings. The Investor Owned Utilities (IOU) authored the plan under the direction of the CPUC, and these utilities are now developing public goods incentive programs for the 2009-2012 program period that support the implementation of this strategic plan.

The ARB recently released their Climate Change Proposed Scoping Plan (October 2008), which outlines proposed strategies to achieve the 2020 greenhouse gas emissions limits. Proposed strategies include zero net energy buildings; more stringent building codes and appliance efficiency standards; broader standards for new types of appliances and for water efficiency, improved compliance and enforcement of existing standards; and voluntary efficiency and green building targets beyond mandatory codes.

The Green Building Standards, ARB's Climate Change Scoping Plan and the CPUC's Energy Efficiency Strategic Plan all include the concept of a tiered approach to implementing energy efficiency in newly constructed buildings. This concept has been successfully implemented in the New Solar Home Partnership and the California Solar Initiative, where either a Tier I (15%) or a Tier II (30%) level of energy efficiency beyond mandatory code is required before an incentive can be received for the installation of a solar electric system. The Energy Commission intends to carry this concept further in the 2011 updates to the Standards by developing, in parallel, both mandatory and voluntary (or "reach") energy efficiency code requirements.

AB1560 (Huffman, October 2007) requires the Energy Commission to prescribe, by regulation, water efficiency and conservation standards for newly constructed residential and non residential buildings, in order to reduce the wasteful, uneconomic, inefficient or

II. SCOPE OF WORK, continued

unnecessary consumption of energy, including the energy associated with the use of water. The Energy Commission is required to demonstrate that the adopted water efficiency or conservation standards are necessary to save energy.

The 2011 Building Energy Efficiency Standards will be designed and specifically targeted to pursue these policy directives. The Energy Commission will develop both mandatory and voluntary levels of Standards for the 2011 update. The Energy Commission has targeted June 2011 for adoption of these updated Standards, with an expected effective date of September 1, 2012.

A separate but related effort under this solicitation is technical support for the evaluation of the cost effectiveness of solar electric systems to determine whether or not these systems should be required on newly constructed buildings. Section 3 of Senate Bill 1 (Murray, 2006), added 25405.6 to the Public Resources Code, which requires the Energy Commission to initiate a public proceeding to study and make findings whether, and under what conditions, solar electric systems should be required in building standards, and requires the Energy Commission to establish numerical targets. When determining the cost effectiveness of solar electric systems, the Energy Commission must consider the availability of government and utility rebates, tax deductions, net-metering, and other financial incentives. The Energy Commission must determine the extent of the continued availability of these incentives if solar electric systems are mandatory and not elective. Task 1 of the Scope of Work addresses this aspect of the requested technical support.

Primary Tasks

This is a “work authorization” Agreement and no work shall be undertaken unless authorized by the Commission Contract Manager through a specific written document called a “work authorization”. Exhibit A of this RFQ is a sample of a work authorization.

The Commission Contract Manager will prepare and issue the written work authorizations and may set a maximum price, budget, and schedule for the work to be performed. The Commission Contract Manager will work, in consultation with the Contractor, to assign work to either the Contractor or a subcontractor. The Energy Commission reserves the right to direct the Contractor to increase expertise on any particular task or key topic area by soliciting for additional subcontractors.

The Contractor is expected to work with the consultants completing utility Codes and Standards Enhancement (CASE) studies and the researchers conducting relevant Public Interest Energy Research Program (PIER) projects throughout the scope of this Agreement. Partnering with the utility Codes and Standards programs and PIER will allow the Energy Commission to leverage other public interest investments to advance the Standards. The Contractor shall provide the technical support which is necessary to ensure that the CASE and PIER consultants are completing the scope of work.

Work Guarantee. The Energy Commission does not guarantee any minimum or maximum amount of work under the Agreement.

II. SCOPE OF WORK, continued

Program meetings and briefings. At the request of the Commission Contract Manager, the Contractor shall be available for meetings or provide written and/or verbal program briefings to the Energy Commission staff or others.

The major task categories in this Agreement are divided as follows:

Task #	Task
1	Evaluation of the Cost Effectiveness of Solar Electric Systems in Nonresidential Building Standards
2	Life Cycle Cost Methodology for the 2011 Standards
3	2011 Standards Nonresidential Measure Identification and Analysis Plan
4	Nonresidential Alternative Calculation Method (ACM)
5	Life Cycle Costs and Energy Analysis Report for Mandatory Nonresidential Standards
6	Life Cycle Costs and Energy Analysis Report for Reach Nonresidential Standards
7	Standards, Reference Appendices, Nonresidential ACM Manuals
8	Impact Analysis Report for Mandatory Nonresidential Standards
9	Impact Analysis Report for Reach Nonresidential Standards
10	Participate in Rulemaking Proceeding
11	Nonresidential Compliance Manuals
12	Contingencies and Additional Topic Areas
13	Contract Management

Note: All workshops and hearings are sponsored, organized, and facilitated by the California Energy Commission.

Task 1 - Evaluation of the Cost Effectiveness of Solar Electric Systems in Nonresidential Building Standards

Section 3 of Senate Bill 1 (Murray, 2006) requires the Energy Commission to determine whether, and under what conditions, solar electric systems should be required in residential and nonresidential building energy standards. The Energy Commission will complete this determination based, in part, on the work to be completed in this task. The Contractor shall complete an evaluation of the cost effectiveness of solar electric systems for new nonresidential buildings to include, but not be limited to, the following activities:

- Review existing literature on solar electric system valuation,
- Consider costs and benefits amortized over the economic life of the building,
- Determine and justify what types of costs and benefits should be included in the analysis, such as: equipment and installation costs; value of avoided electricity generation, transmission and distribution; value of criteria pollutant, volatile organic compounds (VOC) and carbon dioxide (CO₂) emission reductions (including health benefits); value to the electric system infrastructure (e.g. avoided costs of ancillary services and relative ease and speed of deployment);

II. SCOPE OF WORK, continued

value of avoided water use; value of increased jobs and economic activity; and other costs and benefits attributable to solar electric systems.

- Consider solar electric system financial incentives including government or utility rebates and tax deductions, and determine the extent of continued availability of these incentives if solar electric systems are required rather than elective,
- Evaluate the characteristics of a nonresidential building project that makes it best suited to solar electric system requirements, such as: size, location (in relation to both solar access and electric system grid benefits), energy usage (level and pattern), construction project type (newly constructed, addition, or alteration), building type and building ownership, and
- Recommend numerical targets for solar electric installations in nonresidential building standards over a range of future years.

The Contractor will document the work completed in this task in a draft Cost Effectiveness Analysis for Solar Electric Systems for Nonresidential Building Standards Report. Upon the Commission Contract Manager's review and approval of the draft report, or sooner if appropriate, the Commission Contract Manager and the Contractor shall agree to a date and location for a workshop for public review. The Contractor will present the draft Cost Effectiveness Analysis for Solar Electric Systems for Nonresidential Building Standards Report at the workshop and will address issues raised at the workshop in a revised draft Cost Effectiveness Analysis for Solar Electric Systems for Nonresidential Building Standards Report. Additional workshop(s) to review the revised draft report will be held if the Commission Contract Manager deems it necessary. The Contractor will address additional measures or issues identified in later workshops or comments if deemed necessary by the Commission Contract Manager. The Contractor will prepare the final Cost Effectiveness Analysis for Solar Electric Systems for Nonresidential Building Standards Report.

Deliverables: Draft Cost Effectiveness Analysis for Solar Electric Systems for
Nonresidential Building Standards Report
Final Cost Effectiveness Analysis for Solar Electric Systems for
Nonresidential Building Standards Report

Task 2 - Life Cycle Cost Methodology for the 2011 Standards

The Contractor shall identify, develop and implement a methodology for completing life cycle cost analyses to determine the cost effectiveness of measures for inclusion in the 2011 Standards. The methodology will build on the Life Cycle Cost Methodology done for the 2008 Standards. The methodology shall be capable of evaluating the cost effectiveness of measures both incrementally and in combination. The methodology will document all economic assumptions, periods of analysis, and energy (i.e., electricity, natural gas, and propane) forecasts that are included. The methodology will also include the ability to complete sensitivity or scenario analyses on these and other parameters (e.g., measure performance, measure costs, useful lives, fuel costs, avoided costs of climate change, water costs, and emissions values).

II. SCOPE OF WORK, continued

The Contractor will document the proposed life cycle cost methodology in a draft Life Cycle Cost Methodology Report. Upon the Commission Contract Manager's review and approval of the draft Life Cycle Cost Methodology Report, or sooner if appropriate, the Commission Contract Manager and the Contractor shall agree to a date and location for a workshop for public review. The Contractor will present the draft Life Cycle Cost Methodology Report at the workshop and will address issues raised at the workshop in a revised draft Life Cycle Cost Methodology Report. Additional workshop(s) to review the revised draft Life Cycle Cost Methodology Report will be held if the Commission Contract Manager deems it necessary. The Contractor will address additional measures or issues identified in later workshops or comments if deemed necessary by the Commission Contract Manager.

The Contractor will prepare the final Life Cycle Cost Methodology Report. Once the Commission Contract Manager has reviewed and approved the Final Life Cycle Cost Methodology Report, the Contractor will carry out all of the steps in the approved methodology to complete the life cycle cost analysis of all measures under consideration for the 2011 Nonresidential Standards. This work is included in Task 5 and Task 6. The Commission Contract manager will review and approve the methodology applied to the proposed measures.

Deliverables: Draft Life Cycle Cost Methodology Report
Final Life Cycle Cost Methodology Report

Task 3 – 2011 Standards Nonresidential Measure Identification and Analysis Plan

The Contractor shall identify energy, peak load and water savings opportunities (measures) for nonresidential buildings in collaboration with the Commission Contract Manager. The measures to be considered may include, but are not limited to:

- More energy and/or water efficient levels of the measures currently included in the Standards,
- Measures that are options for compliance in the performance standards but are not required,
- New measures proposed by a stakeholder or the Contractor, and
- Measures that may result from the research or other work on the Key Topic Areas (see the description of Key Topic Areas following these task descriptions).

The Contractor shall:

- Fully describe each identified measure,
- Identify and document performance criteria such as design criteria or compliance with testing standards necessary for the measure to be effective and reliable,
- Identify procedures for verifying the proper installation of the measure,
- Review any relevant technical research and literature and existing testing procedures and standards,
- Describe any modeling changes to the Standards nonresidential reference computer program that will be required to effectively evaluate the

II. SCOPE OF WORK, continued

- measure, and assess the feasibility of completing these modeling changes,
- Consult with Standards stakeholders and industry experts knowledgeable about the measure, and
- Provide an initial determination of whether the measure should be considered for the mandatory standards or the reach standards.

For each identified measure, the Contractor shall include development and documentation of plans for additional information about the measure required for completion of subsequent tasks. For each identified measure, these plans shall identify sources of information relating to:

- Costs,
- Useful lifespan,
- Extent of availability,
- Potential for expanding availability,
- Potential for environmental consequences either positive or negative associated with the use of the measure,
- Energy and demand savings,
- Water savings,
- GHG emission reductions,
- The non-energy implications of the measure that may enhance or detract from its acceptance, such as health and safety implications, impacts on perceived comfort and productivity, or potential to enhance property valuation,
- Issues that require further investigation related to performance criteria, environmental consequences, field verification procedures, or non-energy implications, and
- Ability of the measure to contribute to the short and/or long term strategies required to meet California's zero net energy goals (see Key Topic Area A.).

The Contractor shall document plans for each measure in a draft Nonresidential Measure Identification and Analysis Plan. This draft will be submitted to the Commission Contract Manager for review and approval. Upon the Commission Contract Manager's approval of the draft, the Commission Contract Manager and the Contractor shall agree to a date and location for a workshop for public review. The Contractor will present the revised draft Nonresidential Measure Identification and Analysis Plan at the workshop and address issues raised at the workshop in a revised Nonresidential Measure Identification and Analysis Plan. Additional workshop(s) to review the revised draft Measure Identification and Analysis Plan will be held if the Commission Contract Manager deems it necessary. The Contractor will address additional measures or issues identified in later workshops or comments if deemed necessary by the Commission Contract Manager. The Contractor will prepare the final Nonresidential Measure Identification and Analysis Plan.

Deliverables: Draft Nonresidential Measure Identification and Analysis Plan
Final Nonresidential Measure Identification and Analysis Plan

II. SCOPE OF WORK, continued

Task 4 – Nonresidential Alternative Calculation Method (ACM)

The Contractor shall work with the Energy Commission leading the projects described in Key Topic Area H to reorganize and modify the information contained in the 2008 Nonresidential ACM Manual to develop the following documents:

- Nonresidential Performance Compliance Rule Set Documentation. This will include documentation of the data dictionary and rule set language developed for use in defining a Title 24 (T-24) rule set. This will also include a description of each compliance rule in the performance standard written in the rule set language.
- Nonresidential Compliance Engine Documentation. This will include a written explanation of the software developed by others for the Energy Commission which accepts a building description and interprets a Title 24 rule set to compute and compare the energy performance of a proposed building with a standard or “budget” building. The documentation will include, but not be limited to:
 - The required format for the building input description,
 - Explanation of the data libraries used within the Compliance Engine (e.g. climate zone data, American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) design day climatic data, Time Dependent Valuation data, Reference Appendix data),
 - An explanation of the functionality of the Compliance Engine, and
 - A listing of the information produced as output from the Compliance Engine.
- Nonresidential Compliance Software Specification. This documentation will specify the requirements for compliance software that is developed by others for Energy Commission approval as software that can be used to prove compliance with the Title 24 Nonresidential Standards. The specification will include, but not be limited to:
 - The user interface requirements,
 - The reporting requirements, and
 - The requirements for incorporating a Title 24 rule set or the Compliance Engine (which includes the rule set).
- Compliance Software Certification Procedures. This will document the process used by the Energy Commission to certify compliance software, including the tests and test data that will be used and the requirements of the party submitting the software for certification.

The Contractor shall develop a detailed 2011 Nonresidential ACM Manual Outline based on the above documents and relevant materials from the 2008 nonresidential ACM Manual that will be used when ACM Manual updates are made for the 2011 Standards in Task 8.

The Contractor shall also provide the Research Version of 2011 Nonresidential Standards Reference Program specified by the Energy Commission as the reference program for the 2011 Nonresidential Standards. This reference program shall include any modeling changes recommended in the Task 3 Measure Identification and Analysis Plan. This plan will be reviewed and approved by the Commission Contract Manager.

II. SCOPE OF WORK, continued

The Contractor shall make modifications to the Title 24 nonresidential Rule Set and the Nonresidential Compliance Engine as necessary to implement the 2011 updates to the Standards.

Background information for this task is included in Key Topic Area H.

Deliverables: Nonresidential Performance Compliance Rule Set Documentation
Nonresidential Compliance Engine Documentation
Nonresidential Compliance Software Specification
Nonresidential Compliance Software Certification Procedures
2011 Nonresidential ACM Manual Outline
Research Version of 2011 Nonresidential Standards Reference Program
2011 Title 24 Nonresidential Rule Set
Nonresidential Compliance Engine for the 2011 Standards

Task 5 - Life Cycle Costs and Energy Analysis Report for Mandatory Nonresidential Standards

The Contractor shall prepare a Life Cycle Costs and Energy Analysis Report for Mandatory Nonresidential Standards. This report shall contain a general description of and life cycle costing and energy analyses for the proposed measures in the 2011 update to the Standards included in the Nonresidential Measure Identification and Analysis Plan (Note that the Mandatory Standards include all components of these Standards, including mandatory, prescriptive and performance requirements). This report shall cover the scope of proposed code changes for the mandatory level of the Standards. The report will include first draft mark-ups in a format to be identified by the Commission Contract Manager of potential language changes to the Standards, and Nonresidential Alternative Calculation Method (ACM) Manual and Reference Appendices for each measure. The Commission Contract Manager may direct the Contractor to separate this work into two or more sequential reports at the draft phase. The draft report(s) will be reviewed and approved by the Commission Contract Manager. The final report shall combine all draft reports into one report that includes all proposed measures.

The Contractor will address issues raised at public workshops or by the Commission Contract Manager in a revised draft report and prepare supplements to the report to address additional measures or issues identified in later workshops or hearings on the proposed 2011 Standards. The Contractor will prepare the final Life Cycle Costs and Energy Analysis Report for Mandatory Nonresidential Standards. The Final Life Cycle Costs and Energy Analysis Report for Mandatory Nonresidential Standards must also include recommended language changes for the Nonresidential Compliance Manuals.

Deliverables: Draft Life Cycle Costs and Energy Analysis Report for Mandatory Nonresidential Standards
Final Life Cycle Costs and Energy Analysis Report for Mandatory Nonresidential Standards

II. SCOPE OF WORK, continued

Task 6 - Life Cycle Costs and Energy Analysis Report for Reach Nonresidential Standards

The Contractor shall prepare a draft Life Cycle Costs and Energy Analysis Report for Reach Nonresidential Standards. This report shall contain a general description of and life cycle costing and energy analyses for the proposed measures included in the Measure Identification and Analysis Plan (Note that the Reach Standards include all components of these Standards, including mandatory, prescriptive and performance requirements for voluntary levels). This draft report shall cover the scope of proposed code changes for the voluntary or reach level of the Standards. The draft report will include first draft mark-ups in a format to be identified by the Commission Contract Manager of potential language changes to the Standards, Nonresidential Alternative Calculation Method (ACM) Manual; and Reference Appendices for each measure. The Commission Contract Manager may direct the Contractor to separate this work into two or more sequential reports at the draft phase. The Contractor shall submit the draft report(s) to the Commission Contract Manager for review and approval. The final report shall combine all draft reports into one report that includes all proposed measures.

The Contractor will address issues raised at public workshops or by the Commission Contract Manager in a revised report and prepare supplements to the report to address additional measures or issues identified in later workshops or hearings on the proposed 2011 Standards. The Contractor will prepare the final Life Cycle Costs and Energy Analysis Report for Reach Nonresidential Standards. The Final Life Cycle Costs and Energy Analysis Report for Reach Nonresidential Standards must also include recommended language changes for the Residential and Nonresidential Compliance Manuals.

Deliverables: Draft Life Cycle Costs and Energy Analysis Report for Reach
Nonresidential Standards
Final Life Cycle Costs and Energy Analysis Report for Reach
Nonresidential Standards

Task 7 - Standards, Reference Appendices, and Nonresidential ACM Manual

At the direction of the Commission Contract Manager, the Contractor will draft specific mark-ups to language (building on the Measure Identification and Analysis Plan in Task 3) for revisions to the Standards, Reference Appendices, and Nonresidential ACM Manuals (documents), consistent with the work in Tasks 2-7. The scope of this task covers both the mandatory and the reach levels of the Standards. The Contractor will prepare draft documents that delineate all draft revisions. The Commission Contract Manager will instruct the Contractor as to the format of these documents. Upon the Commission Contract Manager's review and approval of the draft documents, or sooner if the Commission Contract Manager deems it appropriate, the Commission Contract Manager and the Contractor shall agree on a date and location for a workshop for public review. The Contractor will present the draft documents at the workshop. If the Commission Contract Manager deems it necessary, the Contractor will prepare

II. SCOPE OF WORK, continued

supplements to address additional measures or issues identified in later workshops or hearings on the proposed 2011 Standards. The Contractor will prepare the final documents: 2011 Standards, Reference Appendices, and Nonresidential ACM Manuals.

Deliverables: Three (3) Draft Documents: 2011 Standards, Reference Appendices, and Nonresidential ACM Manual
Three (3) Final Documents: 2011 Standards, Reference Appendices, and Nonresidential ACM Manual

Task 8 - Impact Analysis Report for Mandatory Nonresidential Standards

The Contractor will provide the Commission Contract Manager with a written draft Impact Analysis Report for Mandatory Nonresidential Standards summarizing the statewide energy savings of the mandatory level of the proposed 2011 Standards to the Commission Contract Manager. The Commission Contract Manager will advise the Contractor on the methodology for estimating the statewide energy savings.

After the Commission Contract Manager has reviewed and approved the draft Impact Analysis Report for Mandatory Nonresidential Standards, the Contractor will present it at a designated workshop and will address issues raised at the workshop in a revised draft report; if the Commission Contract Manager deems it necessary. At the Commission Contract Manager's direction, the Contractor will prepare supplements to the draft Impact Analysis Report for Mandatory Nonresidential Standards to address additional measures or issues identified in later workshops or hearings on the proposed 2011 Standards. The Contractor will prepare the final Impact Analysis Report for Nonresidential Mandatory Standards,

Deliverables: Draft Impact Analysis Report for Mandatory Nonresidential Standards
Final Impact Analysis Report for Mandatory Nonresidential Standards

Task 9 - Impact Analysis Report for Reach Nonresidential Standards

The Contractor will provide the Commission Contract Manager with a written draft Impact Analysis Report for Reach Standards summarizing the statewide energy savings of the voluntary or reach level of the proposed 2011 Standards to the Commission Contract Manager. The Commission Contract Manager will advise the Contractor on the methodology for estimating the statewide energy savings.

After the Commission Contract Manager has reviewed and approved the draft Impact Analysis Report for Reach Nonresidential Standards, the Contractor will present it at a designated workshop and will address issues raised at the workshop in a revised report if the Commission Contract Manager deems it necessary. At the Commission Contract Manager's direction, the Contractor will prepare supplements to the draft Impact Analysis Report for Reach Nonresidential Standards to address additional measures or issues identified in later workshops or hearings on the proposed 2011 Standards. The Contractor will prepare the final Impact Analysis Report for Reach Nonresidential Standards,

II. SCOPE OF WORK, continued

Deliverables: Draft Impact Analysis Report for Reach Nonresidential Standards
Final Impact Analysis Report for Reach Nonresidential Standards

Task 10 - Participate in Rulemaking Proceeding

The Contractor will participate in rulemaking hearings to support the draft Standards and related documents developed in Tasks 8, 9 and 10. Contractor participation shall include, but may not be limited to:

- The presentation of the life cycle reports and other analyses that are the basis of the draft Standards.

The Commission Contract manager will review and approve the presentation materials before the rulemaking hearing.

Deliverables: Participation in Rulemaking Hearings
Power Point presentation materials

Task 11 - Nonresidential Compliance Manual

The Contractor shall identify any necessary revisions to the Nonresidential Compliance Manual and prepare the draft Manual that contain those revisions. The scope of this task covers both the mandatory and the reach Standards. The Contractor will discuss with and obtain approval from the Commission Contract Manager on how best to incorporate the information on the reach Standards (e.g., a compliance manual supplement vs. a separate manual). With assistance from the Commission Contract Manager, the Contractor shall work with their subcontractors, the utilities' CASE initiative consultants, and other entities who worked on updating the Standards and ACM Manuals to update the Compliance Manual.

The Contractor shall submit the draft manual to the Commission Contract Manager for review and approval. When the Commission Contract Manager has reviewed and approved the draft Nonresidential Compliance Manual, or sooner if the Commission Contract Manager deems it appropriate, the Commission Contract Manager and the Contractor shall agree to a strategy for accepting public comments on the Compliance Manual. This may include one or more public workshop(s) as well as public comments received through mail, emails, and phone calls. The Contractor shall work with the Commission Contract Manager to address these public comments in a revised version of the draft Nonresidential Compliance Manual. The Contractor will prepare the final Nonresidential Compliance Manual.

Deliverables:
Draft Nonresidential Compliance Manual
Final Nonresidential Compliance Manual

II. SCOPE OF WORK, continued

Task 12 - Contingencies and Additional Topic Areas

The Contractor shall assist with work to review, research, and develop recommendations for 2011 Standards code change proposals initiated by Energy Commission staff but are not included in the Key Topic Areas. The Contractor shall provide technical support to the Energy Commission in determining the statewide costs and environmental impacts of the proposed 2011 Standards. The Contractor shall provide technical expertise to conduct unexpected research and analytic needs to develop 2011 Standards code change proposals as they arise throughout the Agreement period.

Deliverables: Will be defined as needed through Work Authorizations

Task 13 – Contract Management

Monthly Progress Report

The Contractor shall prepare a monthly progress report which summarizes all activities conducted by the Contractor and their subcontractors. This monthly progress report shall include a summary of Agreement expenditures to date. The monthly progress report is due to the Commission Contract Manager within 15 working days after the end of the month. The Commission Contract Manager will specify the report format and the number of copies to be submitted. All monthly progress reports will coincide with the invoice period.

Invoice

The Contractor shall prepare a monthly invoice for all Agreement expenses performed for assigned work authorizations. An advance copy of the invoice shall be sent to the Commission Contract Manager to ensure that all records are included and the invoice is for authorized work. The official invoice is to be submitted to the Commission Accounting Office. The Commission Contract Manager will specify the invoice format.

Program Meetings and Briefings

At the request of the Commission Contract Manager, the Contractor and their subcontractors shall be available for meetings or to provide written and/or verbal program briefings to the Energy Commission's staff or others. Some meetings will be conducted in person, by phone and the internet, as determined by the Commission Contract Manager.

Work Authorizations

This is a "work authorization" Contract and no work shall be undertaken unless authorized by the Commission through a specific written document called a work authorization. The Commission Contract Manager shall prepare a Work Authorization for each item of work. Any expenses incurred by the Contractor that have not been duly authorized by the Energy Commission Contract Manager shall be borne by the Contractor. No amendments to the work authorization shall be made for work undertaken without the specific, written approval of the Energy Commission Contract Manager. Each Work Authorization shall state:

II. SCOPE OF WORK, continued

- Contract Number, Task Number, and Work Authorization Number (to be assigned by Commission Contract Manager)
- Start/End Dates for the Work Authorization
- Purpose, objective, or goal to be undertaken
- Description (work statement) of the work to be accomplished
- Schedule and Deliverables (including any significant material to be developed and delivered and due dates for each)
- Identification of the contractor/subcontractor team
- Contractor's person hours and billing rates
- Subcontractor Amount (if any)
- Any fees (G&A, ODC, etc.)
- Total cost of the Work Authorization

Subcontractors

In the event subcontractors are part of the contractor's proposal, the Contractor shall manage and coordinate subcontractor activities. The contractor is responsible for the quality of all subcontractor work and the Energy Commission will assign all work to the contractor. When new subcontractors are hired or added, the contractor shall provide the Energy Commission with updated disabled veteran owned business enterprise (DVBE) forms.

Any subcontractor whose work within the proposal would be essential to completion of the tasks in this contract must be identified as a key subcontractor and identified specifically in the proposal. Unless given specific written permission to the contrary, any change in the assignment of key subcontractors after the award of the contract may be deemed a breach in the contract by the Energy Commission and may result in the termination of the contract.

The contractor will work directly with and report to the Energy Commission's Contract Manager on contract status and subcontractor work assignments and progress. Contractor will coordinate subcontractor accessibility to the Energy Commission's Contract Manager.

The Contractor shall require subcontractors to provide invoices that correctly identify expenses charged to each contract task. The Contractor shall also provide subcontractor invoices for invoice payments, showing funds authorized, invoices submitted, and status.

The Contractor shall require subcontractors to copy the Energy Commission's Contract Manager with all final, approved work statement deliverables. All work statement deliverables from the contractor team must be submitted as drafts for review and comment to the Energy Commission Contract Manager.

II. SCOPE OF WORK, continued

Manage Work Authorizations and Subcontractors

At the direction of the Commission Contract Manager, the Contractor shall issue Energy Commission prepared work authorizations which define the scope of work, the schedule of deliverables and the project budget to the subcontractors.

On an ongoing basis the Contractor shall perform the following tasks:

- Prepare and issue contract agreements with subcontractors that include all required provisions contained in the Agreement between the Energy Commission and the Contractor;
- Respond in a timely fashion to information requests or direction from the Commission Contract Manager;
- Coordinate availability of subcontractors to meet needs of the Energy Commission staff;
- Solicit for additional technical expertise upon direction by the Commission Contract Manager;
- Require subcontractors to provide invoices which correctly identify personnel, actual hourly rates and direct expenses charged to each work authorization and provide back-up documentation for expenses; and
- Maintain a current Agreement spreadsheet capable of tracking Contractor and subcontractor work activity, Contractor and subcontractor invoice activity, and the status of work authorizations.

Deliverables:

- Invoices
- Program Meetings and Briefings
- Manage Work Authorizations
- Manage Subcontractors

Tentative Deliverables List and Schedule:

Task #	DELIVERABLES	TENTATIVE DUE DATES
1	Cost Effective Analysis for Solar Electric Systems in Nonresidential Building Standards Report	Sep. 2009
2	Assist with LCC Methodology Development	Sep. 2009
3	<u>Nonresidential</u> Measure Identification and Analysis Plan	Sep. 2009
4	Nonresidential Performance Compliance Rule Set Documentation Nonresidential Compliance Engine Documentation Nonresidential Compliance Software Specification Nonresidential Compliance Software Certification Procedures 2011 Nonresidential ACM Manual Outline Research Version of 2011 Nonresidential Standards Reference Program 2011 Title 24 Nonresidential Rule Set	Apr. 2010 May 2010 Jun. 2010 Jul. 2010 Aug. 2010 Sep. 2010 Feb. 2011 Sep. 2011

II. SCOPE OF WORK, continued

	Nonresidential Compliance Engine for the 2011 Standards	
5	Life Cycle Costs and Energy Analysis Report for Mandatory <u>Nonresidential</u> Standards	Feb. 2010
6	Life Cycle Costs and Energy Analysis Report for Reach <u>Nonresidential</u> Standards	Feb. 2010
7	Standards, Reference Appendices, and Nonresidential ACM Manuals	Feb. 2011
8	Impact Analysis Report for Mandatory <u>Nonresidential</u> Standards	Apr. 2011
9	Impact Analysis Report for Reach <u>Nonresidential</u> Standards	Apr. 2011
10	Participation in Rulemaking Hearings	Feb. 2011
11	Nonresidential Compliance Manuals	Feb. 2012
12	Contingencies and Additional Topic Areas	As directed by Commission Contract Manager
13	Monthly Progress Reports	Monthly throughout the Agreement

III. KEY TOPIC AREAS FOR THE 2011 STANDARDS

The Energy Commission is seeking to contract with a team of consultants for technical support to revise the 2008 California Nonresidential Building Efficiency Standards for 2011. It will be the responsibility of the Contractor to become thoroughly familiar with each of the following key topic areas that are relevant to the nonresidential building sector, the status of ongoing work in each nonresidential topic area outside this Agreement, and additional work necessary to further develop and evaluate options in each nonresidential topic area for possible inclusion in the 2011 Standards. The Energy Commission staff will help identify outside research on these topic areas.

Through the course of this Agreement, some topic areas will continue to be researched in other contracts or in work sponsored by other stakeholders. It will be the responsibility of the Contractor, working with the Commission Contract Manager, to coordinate with other researchers or stakeholders to stay current on the work in each topic area and to build on that work in carrying out the tasks in this Agreement. Some topic areas may become de-emphasized as the Agreement progresses. The Commission Contract Manager will direct the Contractor regarding the relative priority of topic areas and the necessity for continued work in each topic area during the course of this Agreement.

For all topic areas being addressed for the 2011 Standards, the Contractor must complete the basic tasks described in the Scope of Work. For each identified measure to save energy and/or water, the Contractor shall consider both mandatory and reach levels of Standards change proposals. To complete these tasks, the Contractor will determine to what extent work by others on the Key Topic Areas provides sufficient information that can be used directly to complete the tasks, and to what extent additional research and analysis by the Contractor will be necessary to complete the tasks. The Commission Contract Manager may also identify additional research and analysis that the Contractor will be required to complete. The Commission Contract Manager will approve additional research and analysis to be performed by the Contractor that is necessary to complete each task for each topic area.

The Contractor will include individuals on its team who are knowledgeable about the nonresidential key topic areas. Additional topic areas may be identified by the Energy Commission staff or proposed by the public through workshops, hearings, or other comment avenues. The Commission Contract Manager will direct the Contractor on how to proceed on these additional topic areas. The Commission Contract Manager may direct additional technical expertise be recruited for by the Contractor to address these topic areas or additional topic areas added subsequently. These key topic areas include but are not limited to the following:

A. Progression to Zero Net Energy Standards

The 2007 IEPR includes the recommendation to increase the efficiency levels of the building standards and combine them with on-site generation so that newly constructed buildings are net zero energy by 2020 (residential) and 2030 (nonresidential). A net zero energy building consumes only as much energy on an annual basis as can be generated with an on-site or nearby renewable energy system. Both the ARB's Climate

III. Key Topic Areas for the 2011 Standards, continued

Change Draft Scoping Plan and the CPUC's California Long Term Energy Efficiency Strategic Plan strongly support the Energy Commission's zero net energy goals.

The Energy Commission has begun a path toward a tiered approach to achieve zero net energy in future building standards. The base tier will be the traditional mandatory standard that increases in stringency with every code cycle. Additional tiers will be voluntary and represent a "reach" standard for advanced levels of energy efficiency. The intent of the advanced, voluntary tiers is to provide the industry with a framework for distinguishing themselves from the competition and to pilot these enhanced features in the field to see how well they work before determining which of the measures should be included into future mandatory standards. Reach standards are already and will continue to be included in the New Solar Homes Partnership (NSHP) and California Solar Initiative which requires efficiency above the Title 24 mandatory code, and is included in the energy efficiency chapter of the state's Green Building Standard. The advanced efficiency measures within the reach standards should be strongly supported by California utility incentives programs. This coordinated approach can provide a united, consistent and less confusing message to the building industry. Voluntary (reach) energy efficiency standards can easily be adopted by local governments and green building standards programs, allowing them to reference consistent "best practice" standards for energy efficient design and construction, promoting the rapid uptake and demonstration of these standards and enabling their adoption into mandatory standards at the earliest point possible.

Standards for zero net energy buildings must include an expanded scope in comparison to current building codes. Efficiency requirements for water consuming equipment and systems, refrigeration systems, ventilation systems for data centers and laboratories are examples of the expanded scope that will be considered in future Standards. The renewable energy systems required to meet the remaining energy needs after all possible efficiency measures are implemented will also be subject to performance specifications. A simulation-based approach to estimate the installed performance of solar electric systems has been developed by the Energy Commission for NSHP and will be the basis of future Standards work in this area.

In the 2011 Standards, the Energy Commission will make concerted efforts to improve energy efficiency requirements in a manner that is consistent with a long term path to zero net energy buildings. The early work in this Agreement must include setting a long term strategy to achieve zero net energy in newly constructed buildings by 2020 (residential) and 2030 (nonresidential), including determining a more detailed interpretation of "zero net energy", defining the general principles of efficient building energy use that is consistent with this definition, establishing priorities and setting performance targets for interim time periods or Standards cycles. Then, the Energy Commission will use the 2011 Standards update to make incremental changes that are consistent with and enables the implementation of the long term strategy.

B. Reach Standards

An important part of the Energy Commission's strategy to achieve zero net energy in newly constructed buildings is to promulgate both mandatory and voluntary or reach levels of building energy efficiency standards. The 2011 Standards will be the first

III. Key Topic Areas for the 2011 Standards, continued

standards update cycle where mandatory and reach levels of standards will be developed in parallel. Defining reach standards within the 2011 energy code will require completing the same broad set of activities that are accomplished for the mandatory standards, including but not limited, to the following:

- Developing prescriptive requirements,
- Defining eligibility criteria,
- Developing algorithms and modeling rules,
- Estimating life cycle costs,
- Evaluating measure availability, reliability, and environmental implications,
- Developing code specific language,
- Explaining the code and its application in the Compliance Manuals, and
- Integrating the measures into the Alternative Calculation Methods.

C. Scenario Analyses for Standards Impacts

The Energy Commission has a mandate to develop aggressive energy efficiency requirements for newly constructed buildings that are deemed cost effective over the building life cycle. To adequately determine the appropriate levels of energy efficiency to include in building standards, the Energy Commission believes that it must consider all probable future costs and benefits. The 2011 Standards development process will evaluate energy, water and demand savings as well as life cycle costs using scenarios that capture probable futures that affect Standards cost effectiveness, including but not limited to fuel costs, water costs, carbon costs, technology costs, technology performance and weather events influenced by climate change. The Energy Commission has developed several policy scenarios used in the 2008 Integrated Energy Policy Report (IEPR) Update to analyze alternative futures for California's electricity generation system. This IEPR scenarios project includes multiple energy and carbon cost forecasts that can be used to develop a probable range of Standards impacts. The Energy Commission's PIER Climate Change program and others have completed multiple studies on the impacts and related costs of global warming to the state. ARB has estimated the costs for the proposed programs recommended in the Climate Change Proposed Scoping Plan to reduce GHG emissions by specified levels. This information can be used to develop a range of estimates for climate change costs that can inform a new valuation of the avoided costs of new Standards.

D. Water Efficiency

AB1560 mandates the Energy Commission to include cost-effective water savings in its consideration of building energy efficiency design standards. For the 2011 Standards, the Energy Commission will consider the water use impacts of all proposed changes to the energy code.

The 2011 Standards will include water efficiency requirements that are applicable to the design and construction of new buildings, additions and alterations. Water efficiency technologies and strategies will need to be evaluated, including but not limited to irrigation controllers, greywater systems, rainwater catchment systems, use of recycled water in cooling towers or other HVAC (heating, ventilation and air conditioning) and process applications. Technologies and strategies that improve the delivery of hot water on demand, thereby reducing "down the drain" losses while waiting for hot water

III. Key Topic Areas for the 2011 Standards, continued

shall also be considered. The experience with specifying and incenting water saving technologies of the state's regional water agencies and the California Urban Water Conservation Council can be leveraged to better understand technology costs, field performance and overall effectiveness of specific water saving measures. The water conservation practices of other arid states may also be relevant and should be reviewed. This work must also address any health concerns with the use of recycled water in homes and businesses.

It is important to consider local and regional water use issues when developing recommendations for water-based cooling technologies. Although many evaporative cooling technologies are extremely efficient compared to conventional air-conditioning equipment, the fact that evaporative systems consume more water on-site must be mitigated effectively. The 2011 Standards will consider water efficiency requirements for water-based cooling systems, such as condensate capture or water storage, to mitigate any significant levels of water used locally by these systems.

This Agreement work will include establishing a water use budget for residential and nonresidential building occupancies. Analogous to the current Title 24 energy code, the Energy Commission will establish mandatory and prescriptive water efficiency measures, justified on a life cycle cost basis, as well as a performance based approach to achieve the water use budgets that are developed.

E. Greenhouse Gas Performance Standards for Supermarkets

The California Global Warming Solutions Act of 2006 (AB 32) directs the Air Resources Board (ARB) to develop early actions to reduce greenhouse gases as part of the State's efforts to reduce emissions to 1990 levels by 2020. A number of the early action measures recommended by the ARB pertain to control of gases with high global warming potential (GWP). These gases are used in a number of applications, with refrigeration and air conditioning among the most important for society and the economy, and the most emissive.

Through direct and indirect causes (e.g., release of leaking refrigerant and energy consumption), ARB estimates that commercial refrigeration accounts for 6-8 % of California's GHG emissions. ARB estimates that commercial refrigeration systems commonly leak about 35% of the refrigerant in their systems into the atmosphere each year.

These systems also represent a substantial portion of California's statewide energy use and electricity demand, typically being operated as a continuous load throughout the day and therefore on peak. The waste heat from these systems can substantially increase the air conditioning use of the buildings where they are installed. Switching to alternative system designs can have the benefit of simultaneously avoiding refrigerant leakage and reducing energy use. Refrigerant leakage results in systems running at improper charge for a substantial portion of its operation, creating substantial energy efficiency penalties. Refrigerant leakage to the inside of the building can contribute to reduced indoor air quality.

III. Key Topic Areas for the 2011 Standards, continued

The Energy Commission is collaborating with ARB to develop a performance standard to limit GHG emissions from new Supermarkets (and potentially other buildings such as Refrigerated Warehouses and Food Processing Facilities). The intent of the Energy Commission and ARB is to develop a performance standard within Title 24 for specific building types with large refrigeration systems that will consider both energy efficiency and the potential for refrigerant leakage using the same GHG emission metric.

F. Time Dependent Valuation of Energy, Water and GHG Emissions

In the 2005 Standards update, the Energy Commission adopted the policy of valuing building energy costs separately for each hour of the year. This time dependent valuation (TDV) of energy allows the building standards to implicitly address peak demand issues of building energy technologies and strategies. The hourly values used for energy cost TDV were updated for the 2008 Standards, but the Energy Commission staff believes there are additional revisions necessary to better integrate the TDV values with the climate zone data to ensure that the TDV values corresponding to electricity system peaks are allocated appropriately to the hourly building energy estimates. A PIER project is underway to update the TDV energy cost values for the 2011 Standards, but work under this technical support Agreement will be needed to review the results of the PIER project and assess the impacts of the proposed changes.

The value of saving water in the state varies both with time and location and will be an important consideration as the Energy Commission increases the scope of the Standards to include water conservation. The Energy Commission completed an analysis of the energy use imbedded in water for the 2005 IEPR and concluded that water used south of the Tehachapi mountain range carried an energy price tag that is substantially greater than water used in the northern parts of the state. The Energy Commission will need to consider these impacts as well as the TDV of energy when developing the water use budgets for Standards compliance.

For the GHG Performance Standard for Supermarkets key topic area, the Energy Commission will need to estimate GHG emissions from building energy usage as part of the standards compliance process. The Energy Commission will also likely include GHG emissions in the standards compliance reporting requirements, extending the work done in the development of California's Home Energy Rating System (HERS). A recent PIER project developed a GHG calculator for buildings, which produces hourly GHG emissions estimates from building energy use data, typically from an hourly simulation model. The calculator uses the results of an electricity production cost model of the western regional electricity generation system, and captures the hourly variations in GHG emissions due to the mix of power plants typically in operation over the course of a year. The GHG calculator uses the same emission rate factors for every location in the state. This approach to estimating hourly GHG emissions from building energy consumption will need to be evaluated for its applicability to the 2011 Standards.

G. Weather Data

The climate zone data used in the Standards relies primarily on weather events that occurred 30 or more years ago, and is in need of revision with better and more current weather data. The Energy Commission's PIER program is funding a project to review

III. Key Topic Areas for the 2011 Standards, continued

weather and solar data for California that are not only more current, but available in greater detail for more locations, with the goal of identifying recent climate trends in California due to global and regional climate change, as well as to local heat island effects caused by urban development. This climate data analysis will capture the weather patterns that correspond to utility peak load events and the solar availability for photovoltaic (PV) systems. The weather files will be modified so that the data in each file contains representative time series that are coincident across the state, thereby capturing statewide system peak weather events. This approach will allow the TDV energy cost factors applied to building energy simulation results to better reflect the electric system peak events they are designed to incorporate. This PIER project will also generate weather data that captures probable events due to climate change in the state, for use in scenario or sensitivity analyses of proposed changes to the Standards. Finally, this project will explore options to develop weather data at sub climate zone levels to better represent micro climates that exist within the state. If successful, this micro climate data will improve the estimation of energy use impacts and determining solar power production. These weather data updates will need to be evaluated within this technical support Agreement and some refinements may be necessary.

H. Reference Computer Programs and Performance Compliance Rules

The Energy Commission plans to use EnergyPlus to the greatest extent possible as the basis for analysis in the development of the 2011 Nonresidential Standards. The Energy Commission's PIER program has contracted with NREL to deliver and enhance software called the Standards Analysis Platform (SAP). The SAP, using EnergyPlus for building energy analysis, is a set of software tools that NREL developed for simulation-based parametric and optimization studies. The Energy Commission will work with NREL to identify and complete enhancements to the SAP for use in developing and evaluating recommended changes to the Standards. The Contractor shall evaluate the SAP for use in developing Standards recommendations.

The Energy Commission PIER research projects are underway to produce a set of Title 24 nonresidential performance compliance rules written in computer readable code, called the "Title 24 rule set". United States Department of Energy (U.S. DOE), ASHRAE members, energy simulation software vendors and other interested parties are participating in this project to ensure that the data dictionary and rule set language developed to implement the Title 24 performance compliance rules is defined with the breadth and flexibility necessary to define alternate rule sets, such as an ASHRAE 90.1 rule set. One important requirement of the rule set language is that it cannot be specific to any single building energy simulation program. Software will be developed to interpret rule sets and build the requisite input files for EnergyPlus, called the "Rules Interpreter". Other building simulation software vendors may choose to construct rule interpreters specific to their simulation tools. The Rules Interpreter will be included with the Title 24 rule set and other required data into software called the "Compliance Engine", which will accept a building description in a specified electronic format, then compute the performance-based compliance analysis for the nonresidential Title 24 Standards. The Compliance Engine will be capable of computing compliance with other standards if there exists rule set representations of these standards. The Compliance Engine will not be a complete ACM software product as specified in the Nonresidential

III. Key Topic Areas for the 2011 Standards, continued

ACM Manual, but it will provide the central functionality of computing the annual energy usage for both the standard and proposed building using the ACM rules. Software vendors may choose to obtain a free license for the Compliance Engine, and then integrate it into their tools to generate Compliance Software that can be submitted for certification by the Energy Commission.

This work will require a reorganization of the Nonresidential ACM Manual to clearly document the performance-based compliance rules that are included in the rule sets, specify the requirements of software used to prove compliance with the Standards, and delineate the certification procedures for compliance software. This work is included as a task in this Agreement's scope of work. The Contractor shall also consult with the Energy Commission to determine what aspects of the rule set and Compliance Engine projects can be incorporated into the 2011 Standards, based on the timing, scope and status of the PIER funded projects.

I. Envelope Performance

High quality building envelopes is one of the key aspects of passive heating and cooling design. Energy efficient building envelope design that optimizes daylighting and thermal comfort will be an important component of future zero net energy Standards. Siting and designing the exterior façade of commercial buildings occurs very early in the building project, usually at the conceptual design phase. The decisions made during conceptual design have significant energy consequences, yet the architects and planners conducting these early studies rarely consider the energy use impacts of their design choices. For the 2011 Standards, the Energy Commission will explore options to include commercial building envelope energy efficiency requirements that must be met earlier in a building project's permitting process.

Current Standards already require or credit verified quality installation of insulation and HVAC systems. The 2011 Standards will advance these measures and add others to move California's building energy design and construction regulations toward the zero net energy goals for both homes and businesses.

The Energy Commission needs an internal software tool to calculate the heat transfer properties of building assemblies. The Energy Commission is currently reviewing available software tools that evaluate the two dimensional heat transfers through building assemblies. The Contractor may need to make additional recommendations to the Energy Commission on the most applicable software tool available for use, or create templates for an existing software tool to aid Commission analyses.

J. Ventilation for Indoor Air Quality

The Energy Commission has a legislative mandate to consider indoor air quality issues in the Standards. As houses have been tightened up over the last twenty years due to the use of large sheet goods and housewrap, better manufacturing of windows and the discontinuation of masonry fireplaces, normal infiltration and exfiltration levels appear to have been significantly reduced. In the meantime, we have introduced chemicals into our houses through building materials, cleaners, finishes, packaging, furniture, carpets, clothing and other products. The Standards have expected that adequate indoor air quality would be provided by a combination of infiltration and natural ventilation and that home occupants would open windows as necessary to make up any short fall in infiltration. However, The Energy Commission sponsored research on houses built

III. Key Topic Areas for the 2011 Standards, continued

under the 2001 Standards has revealed lower than expected overall ventilation rates, higher than expected indoor concentration of chemicals such as formaldehyde and many occupants who do not open windows regularly for ventilation. The 2008 update includes mandatory mechanical ventilation intended to improve indoor air quality in homes with low infiltration and natural ventilation rates. The 2008 Standards include by reference the requirements of ASHRAE 62.2, *Ventilation and Acceptable Indoor Air Quality (IAQ) in Low-Rise Residential Buildings*, except that the 2008 Standards do not allow operable windows to be used in lieu of mechanical ventilation. The work in this technical support Agreement must include a review of the energy use consequences of the mechanical ventilation requirements in the 2008 Standards and develop recommendations for improving the energy efficiency of these regulations.

The 2008 Standards expanded the requirements for demand controlled ventilation (DCV) in nonresidential buildings to include not only single zone systems but also multi-zone systems that have direct digital controls at the zone level. The 2008 Standards also improved the requirements for CO2 sensor accuracy, calibration and acceptance testing. For 2011, the Energy Commission will look to the results of both state and national research on CO2 sensors to inform further recommendations for demand controlled ventilation code requirements. The National Building Controls Information Center is conducting persistence studies of CO2 sensor accuracy in a controlled laboratory setting, and a PIER field research project conducted by Lawrence Berkeley National Laboratory is testing the persistence of CO2 sensors in existing California buildings.

Conditioning ventilation air is one of the largest uses of energy in commercial buildings. For the 2011 Standards, the Energy Commission will consider requirements for pre-conditioning outside air through the use of heat recovery and/or evaporative pre-cooling technologies. Analysis of pre-conditioning technologies for different building sizes, occupancies, and locations will be necessary to develop code change recommendations.

The Energy Commission must review ASHRAE 62.1 to determine its appropriateness for use in California's building code. Both the Uniform Mechanical Code and the International Mechanical Code reference ASHRAE 62.1. The Energy Commission has not referenced ASHRAE 62.1 in past Standards because for some building occupancies the minimum ventilation rates in the national standard are below the minimum ventilation rates in Title 24, and because the allowable depth of naturally ventilation spaces would be increased from 20 to 25 feet. The Energy Commission will be working with the ASHRAE 62.1 committee to understand the background and basis for the aspects of the standard that differ from Title 24, and determine if these ventilation rates are appropriate for California buildings. The Energy Commission will require the technical support provided in this contract to complete this work.

K. Water Heating

Residential water heating is an important energy end use for the 2011 Standards. For many homes in the state, water heating consumes more energy than either space heating or cooling. Making substantive improvements to the Standards is challenged by the Federal preemptive minimum water heating appliance efficiency standards. The

III. Key Topic Areas for the 2011 Standards, continued

Energy Commission will consider the feasibility of requiring solar thermal technologies for preheating water. The Energy Commission will also focus on improving hot water distribution systems, which will save both energy and water. An ongoing PIER project is conducting laboratory tests on hot water piping and will include recommendations for future Standards changes. Another completed PIER project resulted in a hot water system simulation tool called HWSIM, which can be used for analyses in the 2011 Standards update process. Areas of possible improvements in hot water distribution systems include but are not limited to improving the distribution system multipliers and modeling algorithms within the Residential ACM, requiring plumbing design approval with pipe length and diameter limits, prohibiting hot water piping under slabs, requiring a physical separation of hot and cold water lines, requiring point of use water heaters and waste water heat recovery when appropriate, and requiring insulation on all hot water pipes.

Another PIER water heating project is focusing on multi-family hot water distribution systems, and the Energy Commission will consider the recommendations from this research project when developing the 2011 Standards.

L. HVAC Performance

A PIER project completed in 2008 focused on developing specifications for and field testing residential scale air conditioning systems optimized for the hot dry climates in the arid Southwest. Commercially available air conditioners are designed to meet national performance standards that are roughly based on “average” cooling season weather conditions across the United States. The current design process gives little or no attention to the performance of the air conditioners at the conditions prevalent in California. As a result, substantial energy is wasted by air conditioners in hot dry climates, particularly on peak days. The results from laboratory and field testing demonstrated energy savings of up to 20 percent and peak demand reductions of up to 35 percent from air conditioning systems optimized for hot, dry climates. A specification was developed that manufacturers can currently meet that focuses on improving the sensible cooling capacity by optimizing air flow and fan efficiency. The Contractor shall provide recommendations for how to integrate the results of this project into the 2011 Standards.

The 2008 Standards made improvements to the energy efficiency requirements of residential furnace fans and the Energy Commission is interesting in furthering these improvements in the 2011 Standards. New requirements for pre-cooling strategies or evaporative condensers should also be considered.

Getting equipment sized and installed properly can yield the biggest energy savings compared to current practice, so the Energy Commission must continue to make strides to improve the design and installation of HVAC systems in the Standards. The 2008 Standards include prescriptive requirements for refrigerant charge and air flow, however the industry has continued to voice concerns with implementing the required test procedures for these measures. The Energy Commission must continue to work with the industry to develop effective strategies to implement these measures so that they are employed more often to comply with the Standards. If these efforts are successful,

III. Key Topic Areas for the 2011 Standards, continued

then the Energy Commission can consider making these important air conditioning performance measures mandatory in the 2011 Standards.

M. Roofing System Performance

The 2011 Standards update will include improvements to the energy efficiency of roofs and attics. With the new unconditioned zone model developed for the 2008 residential compliance software, the Energy Commission now has the ability to analyze the energy performance of roofing and attic technologies in more detail. The Contractor shall work with the Energy Commission to evaluate both the energy performance and cost effectiveness of roofing products, to include but not be limited to continuous exterior insulation, garden roofs and materials with a reflectance of 0.40 or higher.

The Energy Commission is interested in evaluating to what extent an increase in roof albedo should be credited for reduced global warming, beyond that due to decreases in building energy consumption. Lawrence Berkeley National Laboratory (LBNL) scientists suggest that increases in roof reflectivity also reduce global warming by reflecting more of the incoming short wave solar radiation back to the atmosphere. The PIER program is funding LBNL to further develop, test and evaluate potential impacts of this hypothesis. The Contractor shall work with LBNL and the relevant Standards stakeholders to help the Energy Commission determine how best to incorporate this topic into the 2011 Standards.

N. Ducts & Duct Tape

The Energy Commission plans to continue its efforts to develop updates to the Standards that reduce HVAC distribution system losses. The Contractor shall review the current credits given to ductless HVAC systems, ducts in conditioned space, ducts buried in attic insulation, duct system design and duct sealing, along with the associated acceptance test requirements, and develop recommendations for code change proposals.

The Energy Commission continues to support the development of an American Society for Testing and Materials (ASTM) duct tape testing procedure, through work with LBNL. The 2011 Standards should include a requirement that tape used to join and seal HVAC duct systems pass the ASTM E2342-03 test procedure.

O. Design Phase Commissioning

For innovative energy efficient lighting and HVAC systems in commercial buildings to succeed, the design intent must be understood early by the building construction team and the systems' performance must be verified. Design phase commissioning is a detailed quality assurance process that can accomplish this. Design phase commissioning starts early in the new building project schedule, typically much earlier than energy code compliance. The Contractor shall discuss options and propose alternative approaches to encourage the practice of design phase commissioning in commercial building design and construction projects through updates to the Standards.

P. Performance Verification/Acceptance Requirements

A new PIER funded project will begin in Spring, 2009 with the California Commissioning Collaborative to evaluate the Title 24 acceptance testing requirements and enforcement

III. Key Topic Areas for the 2011 Standards, continued

procedures to gain an in-depth understanding of the challenges, limitations, and opportunities to achieve the intended energy efficiency. The project will result in recommendations for test and code revisions and a plan for developing the changes and revisions within the timeline for inclusion in the 2011 Standards.

The Energy Commission is also interested in extending the performance verification and acceptance requirements currently required for residential HVAC systems to similar systems included in small commercial buildings. The technical support Contractor shall review the refrigerant charge, air flow and duct sealing acceptance tests for residential HVAC systems and develop the appropriate code change proposals for small commercial HVAC systems.

Q. Efficient Design of Laboratories and Data Centers

In the 2008 Standards, the Energy Commission added regulations for the efficient design of refrigerated warehouses. Laboratory buildings and data centers are two more energy intensive building types that demand attention in the Standards. Design engineers have successfully employed free cooling strategies and optimized the air management systems in data centers to dramatically improve the efficiency of these energy intensive buildings. California's moderate climate regions (where wet bulb temperatures are 55 degrees F or lower for 3,000 or more hours a year) are ideal for the use of water side economizers to pre-cool chilled water supplies. ASHRAE's technical committee, TC 9.9 Mission Critical Facilities, has developed efficiency standards for conditioning data centers. Data center commissioning guidelines have also been developed. The PIER Industrial program has focused on data center efficiency research for several years and has funded ongoing work at LBNL in this area. PIER researchers collaborated with the data center industry to demonstrate the substantial efficiencies possible by supplying direct current (DC) power to data centers. This strategy will be important to consider in the context of future solar electric system requirements for newly constructed buildings.

Analogous best practices have been developed and successfully implemented for ventilating laboratory buildings. A recent amendment to ASHRAE 90.1 includes improvements to the energy efficiency of laboratory buildings. The Contractor shall review the relevant research results and best practice guidelines, ASHRAE 90.1, and discuss cost-effective options with facility design engineers and operators to develop recommendations for adding energy efficiency requirements in the 2011 Standards for both data centers and laboratory buildings.

R. Occupancy Control Applications

The Energy Commission intends to extend energy code requirements for occupancy-based controls to building applications beyond lighting. The operation of elevators and escalators can be adjusted to reduce energy consumption during unoccupied periods. Occupancy control of lighting and non-essential plug loads has been implemented in hotel and motels using room key card activated switching technology. The Energy Commission also wants to explore the inclusion of occupancy-based switching technology requirements in the residential Standards. The Contractor shall review the state of current occupancy-based controls for elevators, escalators, hotel/motel rooms and residences and develop recommendations for code change proposals.

III. Key Topic Areas for the 2011 Standards, continued

S. Code Compliance for Large Scale Building Projects

The Energy Commission believes it is very important to influence land use and site planning processes to achieve the energy savings necessary to meet the state's GHG emission reduction goals. Subdivision planning determines the building orientation of new production homes, which impacts solar access for PV systems and solar heat gains through the building envelope. There are also opportunities to reduce the heat island effect of new developments and plan for community scale renewable energy systems at the project planning stages of a subdivision or an analogous large scale commercial building project.

The Governor's Office of Planning and Research (OPR) is developing new California Environmental Quality Act (CEQA) requirements to reduce the environmental impacts from GHG emissions. As part of this state environmental policy setting process, the ARB is developing recommendations to OPR for GHG thresholds of significance from future residential and commercial building projects. The current draft recommendations from ARB include setting the threshold of significance for building energy related GHG emissions at the Tier II efficiency level. In order for a new building project to claim no significant environmental impact from building energy related GHG emissions, all residential and commercial buildings in the project must be designed and constructed to exceed the mandatory Standards by 30%. There may also be an overall GHG emission threshold established that implicitly encourages renewable energy systems. Since CEQA approval occurs at the project planning stage, it will be very important for future building projects to consider energy efficiency and renewable energy systems early in the subdivision or commercial building land use design phase.

Planners, architects and designers need analysis tools to better understand the energy impacts of specific subdivision design. NREL's Subdivision Energy Analysis Tool (SEAT) software, funded by PIER, will provide a useful start to professionals studying the energy efficiency and solar electric system generation impacts of their subdivision designs.

The technical support Contractor shall research and recommend specific code change proposals that improve the ability of the Standards to improve building energy efficiency and, if appropriate, include solar electric system requirements at the subdivision design phase of new residential building projects or the analogous land use and siting phase of a large commercial building project.

T. Demand Response

The Energy Commission, the California Public Utilities Commission and California's Independent System Operator have recognized demand response as a critical means to avoid rolling blackouts in the state's electricity system. The Energy Commission is interested in approaches that can be taken in the Standards to require equipment that will facilitate demand response. Thermostats that receive a demand response signal and automatically raise or lower temperature setpoints to reduce HVAC system operation is one example of a technology that the Energy Commission anticipates including in the 2011 Standards. The Contractor should have a good working knowledge of the work the Energy Commission completed for the 2008 Standards to develop recommendations for demand responsive residential thermostats. For

III. Key Topic Areas for the 2011 Standards, continued

commercial buildings, there is an international communication standard under development, called OpenADR (Open Automatic Demand Response) that the Energy Commission believes should be reviewed for its applicability in the Standards. The Contractor shall work with the Energy Commission staff to identify, review and recommend demand response technologies for inclusion in the 2011 Standards update.

U. Federal Requirements for State Building Energy Codes

The Federal Energy Policy Act of 1992 (EPAAct) requires States to use national consensus standards as benchmarks to assess the adequacy of state building energy codes. Whenever the International Code Council (ICC) updates these standards [known as the Model Energy Code (MEC) or International Energy Conservation Code (IECC)], DOE must determine if the new version is more energy efficient than the previous version. States must then review their residential building energy codes to determine if they meet or exceed the efficiency of the national consensus standards. The Energy Commission intends in the 2011 Standards to consider changes to keep California's Residential Building Energy Efficiency Standards more energy efficient than the 2009 IECC and relevant supplements. The Contractor will identify requirements within the IECC that are more energy efficient than counterpart requirements in the Standards.

Similarly, when ASHRAE updates its Standard 90.1, DOE is required to determine whether it is more energy efficient than the previous version. If DOE determines that this is the case, state building energy codes for nonresidential and high-rise residential buildings must be changed to be at least as energy efficient as the new version of ASHRAE 90.1. ASHRAE is now maintaining ASHRAE 90.1 as a "continuous maintenance" standard. The Energy Commission intends in the 2011 Standards to consider changes to keep California's Nonresidential and High-Rise Residential Building Energy Efficiency Standards more energy efficient than ASHRAE 90.1. The Contractor shall identify requirements within ASHRAE 90.1 that are more energy efficient than counterpart requirements in the Standards. The Contractor shall also review the draft of ASHRAE 189P, ASHRAE & United States Green Building Council's (USGBC's) collaborative effort to develop a green building standard, to identify measures that should be considered for the 2011 Standards.

Though Federal law requires that state energy codes be at least as stringent as ASHRAE 90.1, the Warren-Alquist did not include Type I occupancies, e.g., hospitals, within the scope of buildings that are required to comply with the Standards. The Office of Statewide Health Planning and Development (OSHPD) is the agency in California that has authority for adopting building standards for hospitals. For the 2011 Standards, the Energy Commission intends to provide technical assistance to OSHPD to identify the portions of the Standards that would be appropriate for OSHPD to adopt as energy efficiency standards for hospitals and to develop modifications to those portions as needed to address the design and operational requirements of hospitals. OSHPD participated in the development of the Green Building Standards and have indicated an interest in incorporating some aspects of the Green Guide for Health Care into the state's green building codes for hospitals. Through these processes the Energy Commission intends to demonstrate that the requirements for state energy codes in federal law are met for California hospitals.

III. Key Topic Areas for the 2011 Standards, continued

V. Codes and Standards Enhancement Initiatives

The investor-owned utilities (IOUs) conduct the statewide Codes and Standards programs through Public Goods Charge funding. For the 2011 Standards, the IOUs are conducting several Codes and Standards Enhancement (CASE) Initiatives. These initiatives address areas of potential change to the Standards that are promising based on the experience of utility research and incentives programs, and they document the potential energy savings, cost implications, and specific approaches associated with utility proposals for Standards changes. The IOUs intend to conduct CASE initiatives for the following topic areas:

Measure	Description	IOU Lead
Nonresidential		
Envelope		
Glazing	The nonresidential solar heat gain coefficient (SHGC) requirements have last been updated in 1998, since that time new glazing products have been developed and the incremental costs of low-e coatings may have changed. The SHGC requirements need to be revisited to optimize energy savings from windows.	PG&E
Envelope /daylighting	Title 24 currently gives credit to overhangs, which can decrease glare from daylight on non-North exposures and when used as an exterior light shelf can expand the depth of usable daylight, for their ability to reduce solar heat gains. The credit for overhangs shall be increased to account for the likelihood that blinds are not closed to reduce glare.	SCE
Skylighting requirement	To realize significantly more savings, increase the current requirements for skylighting in Section 143c from half of the floor area be in the "skylit zone" to 75% or 90% of the floor area when the space is greater than 15 ft tall and greater than 8,000 sf.	PG&E
Skylighting	Revise prescriptive requirements	SCE
Skylighting exemptions	The current requirements for skylighting in Section 143c requires that half of the floor area be in the "skylit zone" when the space is greater than 15 ft tall and greater than 8,000 sf. An evaluation of the cost effectiveness and feasibility of spaces for an existing exemption is needed for easier enforcement and maximization of savings..	PG&E
HVAC		
Economizers	New economizers on small rooftops should have to meet specific performance standards for damper cycles, damper leakage, sensor calibration and functional performance.	PG&E
Economizers	Currently economizers are required on air conditions with capacities greater than 75,000 Btu/hr. Update the	PG&E

III. Key Topic Areas for the 2011 Standards, continued

Measure	Description	IOU Lead
	requirements to cover all sizes of equipment where the control is cost-effective	
Energy Efficiency Ratio (EER)	Review the rationale behind the assertion that EER 10 must be the basis of complying with revised Federal Seasonal Energy Efficiency Ratio (SEER) 13 requirements for air conditioners. Measure review also includes review of pre-emption, review of Air Conditioning and Refrigeration Institute (ARI) and CEC air conditioner efficiency databases and PG&E documents and surveys of EER values for small central air conditioners in the California market.	PG&E
New baseline	Identify the feasibility and cost effectiveness of evaporative pre-cooling, or evaporative condensing for nonresidential buildings. Identify the barriers or opportunities for establishing evaporative cooling as the default prescriptive base case for new nonresidential buildings.	PG&E
ARI fan rating higher SP	Identify the possibility of updating the air conditioners testing standard so that more realistic static pressures (SP) are used for rating air conditioners. Develop a proposed test procedure and take this procedure through the standards development process with ASHRAE and ARI	SCE
DR (PCTs) on all AC	Demand responsive (DR) controls are required for direct digital controls (DDC) to the zone air conditioning systems. Pursue code changes that require programmable communicating thermostats (PCT's) on single zone systems and also Demand responsive controls for variable air volume (VAV) systems that do not have DDC to the zone.	SCE
Variable speed single zone	Identify the smallest size air conditioner where variable speed control is feasible for a single zone system.	PG&E
Large AC	Identify the smallest size air conditioner (AC) where evaporative condensing is cost-effective. Identify the feasibility market share and other barriers associated with this technology, as well as the water usage, water treatment and other related issues.	PG&E
Radiant cooling	Update ACM to model radiant cooling by considering radiant cooling as the base case HVAC system for applications where energy consumption is reduced cost-effectively. Identify market and feasibility barriers to wider use of radiant cooling and heating, and develop prescriptive and performance requirements for radiant cooling and heating.	PG&E
FDD	Require fault detection and diagnostics (FDD) for large HVAC systems. Develop a standard for common fault message messages.	PG&E
HVAC control	Investigate the feasibility and cost effectiveness of occupant responsive HVAC. Document the feasibility and cost	PG&E

III. Key Topic Areas for the 2011 Standards, continued

Measure	Description	IOU Lead
	effectiveness of setting up thermostats or reducing to minimum VAV boxes when zones are unoccupied, and identify other spaces that should also be considered for occupancy control.	
Ventilation	Identify the optimal outside air amounts that include health, productivity and energy impacts of amounts of outside air. Identify if the outside air amounts should be integrated over time and whether minimum outside air amounts could be lower following periods of 100% outside air due to air side economizer operation.	PG&E
Ducts	The solar reflective index (SRI) of galvanized ducts is low due to the low emissivity of metal ducts. Document the feasibility and cost effectiveness of requiring "cool" surfaces or coatings for exterior duct work.	PG&E
Outside air	Acceptance tests for minimum outside air quantities include methods that are rife with error. Develop easy to use, reliable methods for measuring outside air quantities and propose changes to the outside air acceptance testing method (Standards Nonresidential Appendix NA 7.5.1).	PG&E
Eliminate reheat	Traditional single duct VAV systems may have core zones that require cooling provided throughout the year, requiring this cold air to be heated in the perimeter zones during the winter months. Evaluate the feasibility cost effectiveness of alternatives to reheat VAV systems (dual duct, 4 pipe fan coil, dedicated ventilation with radiant etc.)	PG&E
Standby losses	Air conditioners and furnaces have two standby losses: crankcase heaters in air conditioners and standing pilot lights in furnaces. Evaluation of the feasibility and cost effectiveness of controls for heating crankcase oil and electronic ignitions for pilot lights first requires an evaluation of whether they are preempted by Federal appliance efficiency standards.	PG&E
Pre Cooling	Evaluate pre cooling strategies	Sempra
HVAC zoning	In office buildings	SCE

III. Key Topic Areas for the 2011 Standards, continued

Measure	Description	IOU Lead
Outdoor air pretreatment / Dedicated outdoor air systems		SCE
Ductless systems	Variable refrigerant flow systems, for example	SCE
Lighting		
Task/ambient	Evaluate recent research on task/ambient lighting systems and the recommendations of the appropriate Illuminating Engineering Society of North America (IESNA) technical committees to revise indoor lighting power densities (LPD) W/sf based on best available information on acceptable levels of ambient (general) lighting used in conjunction with furniture mounted or plug connected task lighting	PG&E
Low ambient lighting		SCE
Control devices for workplace luminaires	Proximity	SCE
Tailored method (retail)	The primary use of the tailored lighting method is to support higher lighting power densities in retail environments where incandescent display lighting is extensively used or very high light levels are desired. Propose an improved compliance method for retail lighting and other occupancies that make use of the tailored lighting method	PG&E
Adaptation compensation	Modify Title 24 requirements for skylighting in large spaces with high ceilings which provide compensation light levels on bright days so that the design installed lighting power density in skylit spaces can be reduced to that needed for nighttime use. Evaluate the feasibility, energy savings and cost effectiveness of reducing lighting LPDs in large open spaces.	PG&E
Sidelighting controls	Research and propose new daylight responsive control (photocontrol) controlling general lighting in the sidelit zone by windows requirements, so that Title 24 requirements meet or exceed the stringency of the new ASHRAE standard that are feasible, cost-effective, and easy to enforce.	PG&E
Sidelighting	Develop prescriptive requirements	SCE
Photocontrols	Evaluate the energy savings, feasibility and cost effectiveness of the concepts of providing an unlimited amount of adjustment downwards and some allowance for adjusting set points upwards on photocontrol dimmed	PG&E

III. Key Topic Areas for the 2011 Standards, continued

Measure	Description	IOU Lead
	systems. If the outcome is positive, propose a Title 24 code change measure that would be easy to enforce and result in greater energy savings.	
Individual lighting control	Substantial energy savings are possible if lighting is more closely controlled by occupants in open plan offices. Evaluate this possibility as an alternative to very low ambient light levels and the trade-offs and feasibility issues.	PG&E
Retrofit Requirements	Evaluate the issues associated with lighting retrofits, (tenant improvement, gut remodels, replacing fixtures etc) and propose more stringent requirements for updating lighting system so that it complies with 2011 LPDs and so that fluorescent lighting complies with Fed appliance regulations. Consider the trigger events for controls upgrades and evaluate the cost effectiveness and feasibility of all of these requirements.	PG&E
DR controls	Develop, test and refine acceptance tests for DR (demand responsive) lighting controls so that they are generic enough to be compatible with all of the DR systems planned for California's IOU's and municipal utilities while at the same time being specific enough to verify that the DR control is configured to turn off the appropriate number of lights or dim lights to the appropriate level	PG&E
Occupancy Controls	One of the key objectives of retail lighting is to attract the shopper's attention in a way that is pleasurable. Work with retailers and their designers to investigate the opportunities to use occupancy sensing in retail environments and evaluate the energy savings, feasibility and cost effectiveness of darkening surrounding areas to highlight desired areas to attain a calculated power adjustment factor for occupancy sensing controls and a reduced default retail lighting power density	PG&E
Hotel Guest Room Control	Key card occupancy systems that turn on/off lights and select outlets when employed	Sempra
Bi Level Lighting Controls	for Warehouses	Sempra
Bi Level Lighting Controls	for Hotel Hallways	Sempra
Lighting energy density	Revise Title 24 lighting standards from W/sf to kWh/sf	SCE
Outdoor Lighting		

III. Key Topic Areas for the 2011 Standards, continued

Measure	Description	IOU Lead
Security lighting	The appropriate light levels and allowable wattage densities for outdoor lighting need to be revisited and a revised energy standard proposed which also meets acceptable security lighting requirements.	PG&E
Outdoor lighting	Determine if the model lighting ordinance (MLO) may result in lower allowable outdoor lighting wattages than the 2008 Title 24 standard. If this is the case update T-24 with the MLO values through an evaluation of the feasibility, protection of public safety and cost effectiveness of this coordination between the MLO and Title 24 to provide the technical background for this potential code change.	PG&E
Light Emitting Diode (LED) Induction light sources	Update the Title 24 code and attain the required acceptance by the lighting community that lower light levels through the use of induction lighting as compared to Metal halide lighting, as identified by an SCE Emerging Technology study, provide equal satisfaction	PG&E
Bi-level motion sensor controls	Controlling parking lot lighting with motion sensors by dimming lights to half or 1/3 light levels when there is no motion and returning the lighting to full light output can cut lighting consumption substantially.	PG&E
Street lighting	Develop street lighting standards that can be used by local governments and utilities to provide appropriate lighting conditions while minimizing energy consumption.	PG&E, SCE
Outdoor lighting recommendations	Based on a symposium to be held with key stakeholders	SCE
Sign Lighting		
High frequency ballasts	Identify the availability of high temperature high frequency ballasts for use in illuminated signs. Update technology requirements and sign W/sf based on availability of high frequency ballasts for neon, fluorescent and cold cathode light sources.	PG&E
Performance standard	The current Title 24 sign wattage requirements are either a W/sf of sign or specific light source efficacy requirements. Both the wattage density and the technology requirements should be updated to reflect best economically available sign illumination technology.	PG&E
Refrigeration Plant		

III. Key Topic Areas for the 2011 Standards, continued

Measure	Description	IOU Lead
Central refrigerant management systems	Develop a portfolio of measures for supermarket and other occupancies with central refrigerant management systems that closely match the refrigerant measures adopted for refrigerated warehouses. Integrate this work into the GHG Performance Standard for Supermarkets.	
Floating head controls	Consider the costs and savings associated with design of equipment to handle low condensing temperatures and condenser fan speed control.	SCE
Condenser efficiency	Consider setting a design temperature differential between design ambient air temperature and condensing pressure. In Section 126 of the 2008 Title 24 standards, condensers serving refrigerated warehouses have temperature differential (condenser sizing) requirements.	SCE
Condenser fan	Identify the minimum systems size where speed controls make sense from a feasibility and cost effectiveness basis. Identify the appropriate control strategy for controlling speed and the minimum motor efficiency or technology (i.e. electronically commutated motor) for various motor sizes.	SCE
Compressor efficiency	Currently refrigerant compressors do not have a test method or rating protocol which easily compares the relative efficiency of refrigerant compressors. This will require a test standard and then a rating and labeling requirement.	SCE
Part load system efficiency	Controls that match refrigerant flow to load vary from compressor cycling, unloading controls to variable speed compressors. Most refrigeration systems operate at part load most of the time; therefore, part load efficiency is an important determinant of refrigerant energy consumption.	SCE
GHG Performance Standard for Supermarkets	Provide technical support to CEC and ARB to develop a performance standard within Title 24 for specific building types with large refrigeration systems that will consider both energy efficiency and the potential for refrigerant leakage using the same GHG emission metric	SCE
Acceptance tests	Develop acceptance tests that identify when equipment controls, including floating head controls, condenser variable speed drive (VSD) controls, compressor staging or other part load controls, are not working according to the intent of the T-24 standards. Also consider acceptance tests for VSD evaporator fans which would likely be required by Title 20.	SCE
Refrigerated warehouses		
Acceptance tests	Develop acceptance tests that identify when equipment controls, including floating head controls, condenser VSD controls, part load controls, and evaporator fan VSD controls, are not working according to the intent of the T-24 standards. Identify the feasibility, cost effectiveness, need for new tools or skills and the time needed to conduct the	PG&E

III. Key Topic Areas for the 2011 Standards, continued

Measure	Description	IOU Lead
	tests, and whether systems require any design changes for quickly administering the tests.	
Part load control	Develop a proposal which would require part load efficiency comparable to VSD control. Identify the minimum compressor hp this proposal could apply cost-effectively, and identify different methods of part load control and the relative benefits of various control strategies.	PG&E
Evaporator fan efficiency	Research the feasibility and cost effectiveness of an evaporator fan efficiency standard.	PG&E
Condenser fan efficiency	The 2008 Title 24 refrigerated warehouse standard has a requirement based on temperature differential between design ambient temperature and design condensing temperature. However, this can be accomplished by blowing a lot of air through the condenser	PG&E
Refrigerated truck cooling	Overhangs can reduce the cooling loads of trucks while they are being loaded or unloaded at a truck dock. Receptacles for truck air conditioning would allow trucks to turn off the generators for on-board refrigeration	PG&E
Process loads		
Computer rooms	Consider a range of efficiency measures associated with server rooms: higher EER cooling sources, wider range of relative humidity allowed, networked cooling controls so systems are not fighting each other.	PG&E
Data center standards	Standards developed by ASHRAE TC 9.9 for 90.1	SCE
Printer rooms	Reduce ventilation loads by spot exhaust of sources including printer rooms.	PG&E
Fume hoods	Fume hoods with sashes that maintain laminar flow and have VSD on main fan that is maintaining a constant duct pressure. Also consider option of sashes that close based on occupancy sensing in front of fume hood.	PG&E
Kitchen exhausts	Kitchen exhausts that are able to reduce speed based on temperature or other best practice metric.	PG&E
Kitchen exhausts	Filtration can be clogged quickly on kitchen hoods and reduce system efficiency. Consider benefit of pressure sensing across filters and having this displayed near point of use.	PG&E
Boiler-oxygen trim control	Oxygen trim controllers in gas boilers optimize the combustion efficiency of the boiler. Conduct a study which would identify the boiler size at which oxygen trim control is cost-effective, and consider the hours of operation for a large domestic hot water (DHW) boiler, space heating boiler and industrial process boiler.	PG&E

III. Key Topic Areas for the 2011 Standards, continued

Measure	Description	IOU Lead
Cooling towers	Currently Title 24 Section 112 has a minimum gpm per hp requirement for heat rejection equipment (cooling towers, evaporative condensers and air cooled stand alone condensers. Identify a more stringent requirement for industrial loads that is cost-effective and feasible.	PG&E
Compressed air staging control	This proposal would identify appropriate system sizing and staging guidelines so that compressed air systems are operating efficiently during part load conditions. These design guidelines would be codified into simple requirements for compressed air systems.	PG&E
Escalator Occupancy Controls		
Nonres and High-rise Res DHW		
Solar pool heating	Solar pool heating can displace gas or electric heating cost-effectively. Identify under which conditions solar pool heating is cost-effective and applicable.	Sempra
Solar DHW heating	Solar water heaters are cost-effective when they are displacing electric water heating for domestic hot water and for electrically heated spas. Identify the conditions for which these systems are cost-effective, and identify which components are needed to assure that the solar system will have adequate longevity.	PG&E
Forced draft or flue damper	Flue dampers can be interlocked with the gas valve so that the damper closes and inhibits air flow through the heat transfer surfaces when the burner has cycled off. Compare the life cycle energy savings of this measure to the added first costs of adding the flue damper, and consider the cost of systems where the flue damper is incorporated into the boiler.	PG&E
Recirc pump	Pump controls can minimize heat losses from the recirculation loop between the water heater and the piping for the dwelling units with central DHW systems. Identify the system sizes and types where these controls are cost-effective, and develop a performance model for these controls so the controls can be simulated in the ACM.	Sempra
Individual water heaters	Sealed combustion water heaters would have the dual benefit of higher efficiency and in some cases improved indoor air quality. Also conditioned space air is not used for combustion so this places less of an infiltration load on the dwelling unit.	PG&E
Smaller pipe diameter	Updating the Uniform Plumbing Code is long overdue and can save energy and water. This would require working with the appropriate International Association of Plumbing and	PG&E

III. Key Topic Areas for the 2011 Standards, continued

Measure	Description	IOU Lead
	Mechanical Officials (IAPMO) committee and providing technical support that reducing pipe diameters would not cause excessive pressure drop while providing important benefits.	
Forced draft or flue damper	Flue dampers can be interlocked with the gas valve so that the damper closes and inhibits air flow through the heat transfer surfaces when the burner has cycled off. Evaluate whether this measure is preempted by Federal water heater regulations or if this can be considered as an efficiency add-on that is not pre-empted and is cost-effective.	PG&E
Power and Electrical Distribution		
Meter HVAC separately	By isolating HVAC loads it will be easier to benchmark the overall thermal efficiency of buildings. Identify the size of building or the size of total connected HVAC system capacity at which this sub metering would be required.	PG&E
Plug in hybrid bays	Plug in hybrids could be providing significant improvements to air quality, the efficiency of car transportation and may provide a large battery to draw power during times of system peak. Evaluate the costs and the lost opportunity presented by pre-installing conduit to all garage parking spaces.	PG&E
Power quality and power factor	Consider the feasibility and cost effectiveness of requiring that all permanently installed devices in buildings have high power factor, low harmonics and low radial frequency interference. Exceptions would have to be crafted for broad categories of equipment (small size?) that are not cost-effective to require better electrical power quality performance.	PG&E
Standby power	Residential homes having an easily user adjustable time clock control that can turn off all non-essential, non-lighting plug circuits could eliminate stand-by load losses for a significant number of hours.	PG&E Sempra
Reach Standards		
Green building codes	Developing improved above code energy requirements that may be used as a model ordinance	SCE
Advanced performance rating methods	Appendix G –type method of modeling advanced standards (link with rules processor work)	SCE
Compliance process		
Compliance process	Propose single measure forms for retrofits that might receive a counter permit. Such forms would be shorter and focus on prescriptive compliance to alteration measures.	PG&E
Streamlined	Consider a proposal to split Title 24 into three shorter codes for residential, nonresidential and multi-family occupancies.	PG&E

III. Key Topic Areas for the 2011 Standards, continued

Measure	Description	IOU Lead
code	Identify opportunities to streamline the code and simplify compliance.	
Commissioning	Propose acceptance tests from experience with retro commissioning or commissioning programs that have identified common failure modes that can be identified with a short directed acceptance test.	PG&E
Operations	Research and propose a method to assure that new building owners receive a permanent copy of the information needed to maintain and operate building equipment efficiently, as well as copies of the acceptance tests and that the building owners are made aware that these acceptance tests are the promise by the testing agent that the equipment works correctly on the day of the test.	PG&E
Acceptance Tests	Evaluate existing acceptance tests and make recommendations for improvement - CA Commissioning Collaborative	SCE, PG&E, SMUD
Climate zones	Remapping San Diego climate zones	Sempra

The Contractor will provide technical support to assist the Energy Commission in the review and improvement where necessary of these utility CASE Initiatives, and integration of these proposals into the 2011 Standards. This will include coordination with the utilities for review of the technical work and draft CASE initiative reports prior to public presentation, and integration of CASE initiative conclusions into the Standards, ACM manuals, Reference Appendices, and compliance manuals.

W. Utility Measurement, Assessment and Evaluation Studies (MA&E)

On an ongoing basis, the utilities conduct measurement, assessment and evaluation (MA&E) studies to collect data for improving utility program design and effectiveness. Utility MA&E studies related to codes and standards programs and new construction programs can provide valuable data regarding the energy using characteristics and features of new California buildings, the level of compliance with the existing Standards, and perceptions of key factors in the construction process for how to increase the efficiency of new California buildings. For the last three code cycles, DOE 2.1 simulations of new nonresidential buildings that were created as a result of Nonresidential New Construction MA&E studies were used to estimate the impacts of proposed Nonresidential Standards changes. The 2011 Standards should attempt to make maximum use of the data and findings of utility MA&E studies.

X. Feedback on and Refinement of 2008 Standards

As the 2008 Standards are implemented, the Energy Commission expects to receive feedback on how to refine them to be more effective. The Contractor will provide technical support to evaluate potential refinements and develop needed changes to the Standards and ACM manuals.

IV. SOQ Format and Required Documents

About This Section

This section provides Bidders with information about how to prepare a Statement of Qualifications (SOQ) in response to this RFQ. Bidders must follow all SOQ format instructions, answer all questions, and supply all requested data.

Pricing/Rates Information

Do not submit any price quotes or bids in your SOQ since this will be negotiated with the top rated Bidder.

Required Format

The following topics constitute the mandatory order of presentation for an SOQ. Provide one (1) original and eight (8) copies. The Firm must submit the original and copies in a sealed envelope labeled with the RFQ title and number. Two-sided copying is preferred.

Firms must also submit electronic files of the qualifications on [CD-ROM diskette](#) along with the paper submittal. Electronic files must be in Microsoft Word XP (.doc) format and Excel Office Suite formats. Electronic files submitted via e-mail will not be accepted.

VOLUME 1, Administrative Response

1. Cover Letter
2. Table of Contents
3. Required Documents and Statements
 - Contractor Status Form
 - Darfur Contracting Act Form
 - Completed Disabled Veteran Business Enterprise Forms
 - Signed Contractor Certification Clauses

VOLUME 2, Technical Response

1. Approach to Tasks in Scope of Work
2. Contractor Qualifications
3. Cost Minimization
4. Project Team Organization Structure
5. Project Team Relevant Experience and Qualifications
6. Customer References

IV. SOQ Format and Required Documents, continued

VOLUME 1, ADMINISTRATIVE RESPONSE FORMAT

Cover Letter

Each Bidder shall submit a cover letter on company letterhead that includes a reference to the RFQ title and number, a statement that the bidder is willing to enter into a contract with the state, and signed by a person having the authority to commit the bidder to a contract.

Table of Contents

Each SOQ must include a Table of Contents organized in the mandatory order cited previously and with corresponding page numbers.

Required Documents and Statements

Every Bidder must complete and include the following forms with their SOQ:

1. Contractor Status Form
2. Disabled Veteran Business Enterprise (DVBE) forms (Bidders who qualify as government entities are exempt from this requirement).
3. Contractor Certification Clauses
4. Darfur Contracting Act Form

VOLUME 2, TECHNICAL RESPONSE FORMAT

Approach to Tasks in Scope of Work

Describe the Bidder's approach to providing services listed in the Scope of Work, highlighting outstanding features, qualifications, and experience.

Contractor's Qualifications

Recruitment and Management of Subcontractors

Describe the Bidder's approach to working with the Commission Contract Manager to identify the appropriate subcontractors from the consultant team to work on specific tasks. Describe the Bidder's approach to establish service contracts with subcontractors and to manage the subcontractor's work in partnership with the Commission Contract Manager. Describe the Bidder's approach to soliciting for additional technical expertise if the Commission Contract Manager determines that the consultant team does not sufficiently provide the required services for a specific task or key topic area in the Scope of Work.

IV. SOQ Format and Required Documents, continued

Analytical Tools

Describe what type of computers and/or analytical tools will be used to accomplish the tasks listed in the Scope of Work.

Cost Minimization

Without revealing hourly rates or cost, describe the efforts that the Contractor will take to minimize costs to the Energy Commission in the successful performance of this Agreement. For example:

In-State Travel Costs

What policy will the Contractor adopt as related to team member time charges when the team member is traveling and/or not working actively on the Agreement?

Out of State Travel Costs

It is the Energy Commission's intent to reimburse contractors for airfare within California. If the Contractor and/or team members are located out of state, will the Contractor establish an office in California and/or initiate all travel and related time charges from this California office, and not the out of state office? The Energy Commission is interested in reimbursing the Contractor for active time spent working on this Agreement, not travel.

Project Team Organization Structure

1. Describe the organizational structure of the Bidder, including providing an organizational chart of the entire contract team.
2. Advise the location of the Bidder's and Subcontractor's headquarters and satellite office(s) and proposed methods of minimizing costs to the State.
3. Provide a short description of each firm and key members on the team. Describe the relationship between the Contractor and subcontractors on your team. Describe the organization, composition, and functions to be performed by staff members of the Bidder and any subcontractors and how the staff pertains to this Agreement.
4. Identify a primary contact person. This person should participate in the discussion session. At least one person from each technical area should also participate.
5. Describe any technical capabilities that would facilitate communicating with the Energy Commission (e.g., web conferencing capability and document management practices).
6. Describe Bidder's strategy to replace any subcontractor or add subcontractors to increase expertise for any task or key topic area as directed by the Commission Contract Manager.

IV. SOQ Format and Required Documents, continued

Project Team Relevant Experience and Qualifications

1. Separately document the (1) bidder's and (2) project team's "Architectural, landscape architectural, engineering, environmental and/or other qualifications as they apply to performing the tasks described in the Scope of Work. For each company, person or other entity on the team, separately list all professional licenses, degrees, etc. possessed by each such company, person or entity. Describe the nature and scope of recently completed work as it relates to the Scope of Work
2. Document the professional engineering and architectural design and construction experience of the project team. Identify and list all Bidder staff and subcontractors (all team members) who will be committed to the tasks and describe their roles.
3. Describe job classification, relevant experience, education, academic degrees and professional licenses of these technical staff team members.
4. Provide a current resume for all team members listed and identify the percentage of time each team member will be available throughout the Agreement.
5. Identify the percentage of time each team member will be available throughout the Agreement.
6. Describe their familiarity with the administration, management, and technical expertise in performing pertinent tasks identified in the Scope of Work.
7. Describe the project team's experience working on or advising solar electric system cost-effectiveness analyses, PIER research projects, and utility Codes and Standards Enhancement studies.
8. Describe the project team's experience with Title 24 Standards development and implementation, and the project team's experience with other relevant standards (e.g. IECC, ASHRAE Std. 90.1, 189, 62.1, 62.2)

Customer References

Each Bidder shall complete a Customer Reference Form. Three customer references are required for the Bidder and three customer references are required for each subcontractor.

V. RFQ Administrative Requirements

About This Section

This section provides Bidders details in submitting a successful SOQ, including definitions of important terms, sources of information, submitting the SOQ, confidential information, grounds for rejecting an SOQ, and other administrative details.

RFQ Defined

The competitive method used for this procurement of services is a RFQ. An SOQ submitted in response will be scored and ranked based on the criteria in this RFQ. Every SOQ must establish in writing the Bidder's ability to perform the RFQ's tasks. The Energy Commission may conduct discussions and select the most qualified Bidder. The Energy Commission will negotiate an Agreement with the selected Bidder for compensation which the Energy Commission determines to be fair and reasonable.

Where and How to Deliver the SOQ

A Bidder may deliver an SOQ by:

- U.S. Mail,
- in person, or
- messenger service.

All SOQs must be **delivered** to the Energy Commission's Contracts Office at 1516 Ninth Street, M-S 18, Sacramento, CA 95814, by 3:00 P.M. on the deadline to submit SOQ date. Any SOQ received after 3:00 P.M. will not be accepted. E-mail and facsimile (FAX) transmissions **WILL NOT** be accepted in whole or in part under any circumstances.

Important Administrative Details

Bidder's Cost

The Bidder is responsible for the cost of developing an SOQ and this cost cannot be charged to the State.

Confidential Information

No confidential information is allowed to be submitted in your SOQ. Any SOQ that contains confidential information shall be rejected.

Darfur Contracting Act of 2008

Effective January 1, 2009, all Requests for Proposals (RFP) must address the requirements of the Darfur Contracting Act of 2008 (Act). (Public Contract Code sections 10475, *et seq.*; Stats. 2008, Ch. 272). The Act was passed by the California Legislature and signed into law by the Governor to preclude State agencies generally

V. RFQ Administrative Requirements, continued

from contracting with “scrutinized” companies that do business in the African nation of Sudan (of which the Darfur region is a part), for the reasons described in Public Contract Code section 10475.

A scrutinized company is a company doing business in Sudan as defined in Public Contract Code section 10476. Scrutinized companies are ineligible to, and cannot, bid on or submit a proposal for a contract with a State agency for goods or services. (Public Contract Code section 10477(a)).

Therefore, Public Contract Code section 10478 (a) requires a company that currently has (or within the previous three years has had) business activities or other operations outside of the United States to certify that it is not a “scrutinized” company when it submits a bid or proposal to a State agency. (See # 1 on Attachment 2).

A scrutinized company may still, however, submit a bid or proposal for a contract with a State agency for goods or services if the company first obtains permission from the Department of General Services (DGS) according to the criteria set forth in Public Contract Code section 10477(b). (See # 2 on Attachment 2).

Disabled Veteran Enterprises

This Agreement is subject to a participation goal of three percent (3%) certified California Disabled Veteran Business Enterprises (DVBE) as set forth in Public Contract Code sections 10115, et seq.

Disabled Veteran Business Enterprises (DVBE) Compliance Requirements

If you are a non-governmental entity, you must have either three percent DVBE participation, **or** you must demonstrate a good faith effort to obtain DVBE participation. It is important that you thoroughly read the instructions provided on Attachment Form 3.1. The DVBE compliance process is as follows:

Option A – Commitment to full DVBE Participation – For a Bidder who is a DVBE or who is able to meet the commitment to use identified DVBE(s) to fulfill the full DVBE participation goal.

Option B – Good Faith Effort – For a Bidder documenting its completed effort, made prior to the Bid due date, to obtain DVBE participation that may result in partial or no DVBE participation.

Additionally, you may improve your bid status based on your DVBE efforts through the DVBE Incentive Program. The DVBE Incentive Program gives a contractor an opportunity to improve their bid status based on the efforts attained from the DVBE Participation Program

“Commercially Useful Function” Requirements For DVBE

A certified DVBE shall provide goods or services that contribute to the fulfillment of the contract requirements by performing a **commercially useful function**.

V. RFQ Administrative Requirements, continued

A DVBE is deemed to perform a **commercially useful function** if it does all of the following:

1. Is responsible for the execution of a distinct element of the work of the contract.
2. Carries out its obligation by actually performing, managing, or supervising the work involved.
3. Performs work that is normal for its business services and functions.
4. Is not further subcontracting a portion of the work that is greater than that expected to be subcontracted by normal industry practices.

A contractor, subcontractor, or supplier will not be considered to perform a **commercially useful function** if the contractor's, subcontractor's, or supplier's role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of DVBE participation.

Notice of Selection

Subsequent to the SOQ evaluations and discussion interviews, the Energy Commission will post a "Notice of Selection" at the Energy Commission's headquarters in Sacramento, and on the Energy Commission's Web Site.

California Energy Commission
Contracts Office
1516 Ninth Street, MS-18
Sacramento, CA 95814

Negotiations

Pursuant to Title 20, California Code of Regulations (CCR), section 2565 and Public Contract Code (PCC) 6106, within 14 days after posting the Notice of Selection, the Energy Commission will begin negotiations with the top ranked Bidder for an acceptable fee (hourly rates). The top ranked Bidder will be required to submit a list of rates after written notification of selection. If negotiations with the top ranked Bidder fails, the Energy Commission will enter into negotiations with the next highest Bidder, and so on.
Notice of Proposed Award

Subsequent to the negotiations, the Energy Commission will post a "Notice of Proposed Award" at the Energy Commission's headquarters in Sacramento, and on the Energy Commission's Web Site.

California Energy Commission
Contracts Office
1516 Ninth Street, MS-18
Sacramento, CA 95814

V. RFQ Administrative Requirements, continued

RFQ Cancellation

If it is in the State's best interests, the Energy Commission reserves the right to do any of the following:

- Cancel this RFQ,
- Amend this RFQ, or
- Reject any or all SOQs received in response to this RFQ

RFQ Amendments

If the RFQ is amended, the Energy Commission will send an addendum to all parties who requested the RFQ and will also post it on the Energy Commission's Web Site: www.energy.ca.gov/contracts and Department of General Services' Web Site: www.cscr.dgs.ca.gov/cscr.

Errors

If a Bidder discovers any ambiguity, conflict, discrepancy, omission, or other error in the RFQ, the Bidder shall immediately notify the Energy Commission of such error in writing and request modification or clarification of the document. Modifications or clarifications resulting from this notice will be posted on the Energy Commission's Web Site without divulging the source of the request for clarification. The Energy Commission shall not be responsible for failure to correct errors.

Modifying or Withdrawing an SOQ

Withdrawal/Modification

A Bidder may, by letter to the Contact Person, withdraw or modify a submitted SOQ before the deadline to submit an SOQ. An SOQ cannot be changed after that date and time.

Immaterial Defect

The Energy Commission may waive any immaterial defect or deviation contained in a Bidder's SOQ. The Energy Commission's waiver shall in no way modify the SOQ or excuse the successful Bidder from full compliance.

Disposition of Bidder's Documents

On the submission date, all SOQs and related material submitted in response to this RFQ become the property of the State. After the Notice of Proposed Award is posted, all SOQs and related materials become public records. In addition, all evaluation and scoring sheets become public records after the Notice of Proposed Award is posted. The original SOQ may be returned to a Bidder upon written request.

Contract Requirements

See the Standard Agreement sample included in this RFQ.

V. RFQ Administrative Requirements, continued

No Contract Until Signed & Approved

No Agreement between the Energy Commission and the successful Bidder is in effect until the contract is signed by the Contractor, approved at an Energy Commission Business Meeting and signed by the Energy Commission Contracts Manager.

Conflict of Interest

Pursuant to 20 CCR 2569, Bidders are prohibited from offering, soliciting, or accepting gifts, services, loans, rebates or payments of any kind (such as kickbacks) from any Energy Commission employee.

Bidders' Admonishment

This RFQ contains the instructions governing the requirements for a firm quotation to be submitted by interested Bidders, the format in which the technical information is to be submitted, the material to be included, the requirements which must be met to be eligible for consideration, and Bidder responsibilities. Bidders must take the responsibility to carefully read the entire RFQ, ask appropriate questions in a timely manner, submit all required responses in a complete manner by the required date and time, make sure that all procedures and requirements of the RFQ are followed and appropriately addressed, and carefully reread the entire RFQ before submitting a proposal.

Grounds to Reject an SOQ

An SOQ shall be rejected if:

- It is received after the exact time and date set for receipt of SOQs.
- It is considered nonresponsive to the California DVBE participation requirements.
- It is lacking a properly executed Contractor Certification Clause(s).
- It is lacking a properly executed Darfur Contracting Act.
- It contains false or intentionally misleading statements or references which do not support an attribute or condition contended by the Firm.
- If the SOQ is intended to erroneously and fallaciously mislead the State in its evaluation of the SOQ and the attribute, condition, or capability is a requirement of this RFQ.
- There is a conflict of interest as stated in this RFQ.
- It contains confidential information.

An SOQ may be rejected if:

- It is not prepared in the mandatory format described.
- It is unsigned.
- It does not literally comply or contains caveats that conflict with the RFQ and the variation or deviation is not material, or it is otherwise nonresponsive.

VI. Qualifications Evaluation

Selection Process Steps

The Energy Commission will organize a committee whose members have expertise in evaluation of architectural and engineering services. The Evaluation Committee will evaluate the SOQs as follows:

Fulfillment of RFQ Mandatory Format

The Contracts Office will first identify those Bidders who SOQs adheres to the mandatory format outlined in this RFQ. Bidders who do not follow the mandatory format may be eliminated from the competition.

Evaluation of Qualifications

The Evaluation Committee will review and score all remaining SOQs based on the Evaluation Criteria in this RFQ. The preliminary final score for each SOQ reflects the average of the combined scores of all Evaluation Committee members.

Discussions

The Evaluation Committee shall conduct discussions during the Evaluation Process with no less than the top three Bidders regarding qualifications and methods for furnishing the required services. The Evaluation Committee may use patterned questions and/or questions specific to an SOQ to conduct Bidder discussions. The Evaluation Committee may provide the Bidders with a copy of the questions and/or issues to be addressed and a format for structured discussions.

Upon completion of the discussions the Evaluation Committee may make adjustments to the scores and re-rank the Bidders. From the Bidders with which discussions are held, the Evaluation Committee shall select no less than three Bidders, in order of preference, based upon the established criteria, who are deemed to be the most highly qualified to provide the required services. Bidders should anticipate travel to the Energy Commission Headquarters for the discussions.

VI. Qualifications Evaluation, continued

How the SOQ Will be Scored

The Evaluation Committee will award points for the technical criteria based on the following considerations.

Point Scale

0-1 Points	<ul style="list-style-type: none">✓ The response is not in substantial accord with the RFQ requirements.✓ Has a potential significant effect on the amount paid or net cost to the State or the quality or quantity of the product and/or service.✓ Provides an advantage to one competitor over the other competitors. For example, not paying minimum wages.
2-4 Points	<ul style="list-style-type: none">✓ The SOQ states a requirement, but offers no explanation of how or what will be accomplished.✓ SOQ does not completely respond to the criteria. Information presented does not provide a good understanding of Bidder's intent, does not give detailed information requested by the RFQ, or does not adequately support the SOQ.✓ The response contains a technical deficiency which is an inaccurate statement or reference concerning the how, what, where, or when, which is part of an overall statement or description.
5-6 Points	<ul style="list-style-type: none">✓ Satisfies the minimum requirements and describes generally how and/or what will be accomplished.✓ Provides an average understanding of the Bidder's response to the RFQ.
7-8 Points	<ul style="list-style-type: none">✓ Response satisfies the minimum requirements and specifically describes how and/or what will be accomplished in an exemplary manner, using sample products and illustrative materials (i.e. diagrams, charts, graphs, etc.).✓ A response which gives a clear and detailed understanding of the Bidder's intent. Response presents a persuasive argument supporting the SOQ.
9-10 Points	<ul style="list-style-type: none">✓ Exceeds the minimum requirements and specifically describes how and/or what will be accomplished in a superior manner, both quantitatively and qualitatively, using sample products and illustrative materials (i.e., diagrams, charts, graphs, etc.).✓ Outstanding response with clear, detailed and relevant information exceeding the information requested. Response presents a compelling argument supporting the SOQ.

Ranking an SOQ

After each SOQ is scored, it will be placed on a list, in rank order, with the highest scoring SOQ placed first and the remainder in descending order based on score.

VI. Qualifications Evaluation, continued

Criteria for Evaluation

Criteria	Key Elements	Weight	Max Points	Point Total
1. Company/Team Organization	<ul style="list-style-type: none"> a. Team management structure b. Organization administrative structure c. Appropriate level and type of staffing d. Accessibility to the Energy Commission e. Approach to Contract Management f. Ability to effectively and efficiently recruit additional subcontractors in response to Commission direction 	2.5	10	25
2. Experience and Qualifications	<ul style="list-style-type: none"> a. Professional Engineering and Architectural Experience for Commercial Building Design and Construction b. Active Participation in Professional Engineering and Architectural Trade Associations (e.g. ASHRAE, AIA, USGBC) c. Specific Knowledge and Experience Concerning Each Key Topic Area d. Specific Knowledge and Experience Concerning Each Work Statement Task e. Specific Knowledge and Experience Concerning Development and Implementation of California Building Energy Efficiency Standards f. Effectiveness and Efficiency of Proposed Approaches to Address Each Key Topic Area g. Demonstrated Ability to Organize and Manage a Team of Engineers, Architects and other Technical Experts to Effectively Complete Work Statement Tasks and Deliverables in a Timely Manner h. Efficiency and Effectiveness of Proposed Approaches to Address Topic Areas Not Anticipated by this RFQ 	4.5	10	45
3. Approach to Work Statement and Methodology	<ul style="list-style-type: none"> a. Consistency with Work Statement emphasis and priorities b. Thoroughness and clarity of proposal c. Demonstrated experience with similar tasks d. Demonstrated understanding of Scope of Work tasks e. Ability to effectively modify approach to work to respond to Commission work authorization direction 	3	10	30
OVERALL TOTAL SCORE (Maximum Points)				100
MINIMUM PASSING SCORE				70

VI. Qualifications Evaluation, continued

Non-Technical Incentive and Preference Points

DVBE Incentive			
Target Area Contract Performance Act Adjustment:			
Enterprise Zone Act Adjustment:			
Local Agency Military Base Recovery Area Adjustment:			
FINAL ADJUSTED SCORE			